Chapter 4
Future Needs/Improvement Plans

FUTURE DEMAND AND LAND USE

The Beaverton Transportation System Plan Update addresses existing system needs and additional facilities that are required to serve future growth. Metro's urban area transportation forecast model was used to determine future traffic volumes in Beaverton. This forecast model translates assumed land uses into person travel, selects modes, and assigns motor vehicles to the roadway network. These traffic volume projections form the basis for identifying potential roadway deficiencies and for evaluating alternative circulation improvements. This section describes the forecasting process including key assumptions and the land use scenario developed from the existing Comprehensive Plan designations and allowed densities.

Projected Land Uses

Land use is a key factor in developing a functional transportation system. The amount of land that is planned to be developed, the type of land uses, and how the land uses are mixed together have a direct relationship to expected demands on the transportation system. Understanding the amount and type of land use is critical to taking actions to maintain or enhance transportation system operation.

Projected land uses were developed for areas within the urban growth boundary and reflect the Comprehensive Plan and Metro's land use assumptions for the year 2020. Complete land use data sets were developed for the following conditions.

- Existing 1994 Conditions (based travel forecast for the region)
- Year 2020 Conditions

The base year travel model is updated periodically and for this study effort, the available base model provided by Metro was for 1994. Land uses were inventoried throughout Beaverton by

Metro. This land use database includes the number of dwelling units, the number of retail employees, and the number of other employees. Table 4-1 summarizes the land uses for existing conditions and the future scenario within the Beaverton TSP Update study area. Since development of the 2015 Beaverton TSP, more detailed analysis tools were developed that allow refined calculations of the land use data. Therefore, Table 4-1 summarizes data only the for specific land use within the 2020 Beaverton TSP study area (unlike the previous TSP where the land use summaries included data for areas on the fringe of Beaverton in addition to that within Beaverton). However, while these summaries only outline land use in Beaverton for the purposes of this study, the travel demand forecasts that have been evaluated reflect the regional land use growth throughout the Portland metropolitan area (the four county area). A detailed summary of the uses for each Transportation Analysis Zone (TAZ) within the Beaverton study area is provided in the Appendix.

Table 4-1
Beaverton Land Use Summary

Land Use	1994	2020	Increase	Percent Increase
Households (HH)	46,861	68,997	22,136	47%
Retail Employees (RET)	14,585	26,514	11,929	82%
Other Employees (OTH)	61,822	102,835	41,013	66%

Note: The 2015 TSP land use numbers reflected an area beyond the 2020 TSP Study Area. In general, annual growth rates from 2015 to 2020 are similar to the 1994 to 2015 annual growth rates.

At the existing level of land development, the transportation system generally operates without significant deficiencies in the study area. As land uses are changed in proportion to each other (i.e. there is a significant increase in retail employment relative to household growth), there will be a shift in the overall operation of the transportation system. Retail land uses generate higher amounts of trips per acre of land than households do and other land uses. The location and design of retail land uses in a community can greatly affect transportation system operation. Additionally, if a community is homogeneous in land use character (i.e. all employment or residential), the transportation system must support significant trips coming to or from the community rather than within the community. Typically, there should be a mix of residential, commercial, and employment type land uses so that some residents may work and shop locally, reducing the need for residents to travel long distances.

Table 4-1 indicates that significant growth is expected in Beaverton in the coming decades. The transportation system in Beaverton should be monitored to make sure that land uses in the plan are balanced with transportation system capacity. This TSP balances needs with the forecasted 2020 land uses.

For transportation forecasting, the land use data is stratified into geographical areas called transportation analysis zones (TAZs), which represent the sources of vehicle trip generation. There are 107 Metro TAZs within the Beaverton TSP Update study area. These 107 TAZs were subdivided, as part of this plan, into 391 TAZs to more specifically represent land use in Beaverton. The disaggregated model zone boundaries are shown in Figure 4-1.

Metro Area Transportation Model

A determination of future traffic system needs in Beaverton requires the ability to accurately forecast travel demand resulting from estimates of future population and employment for the City. The objective of the transportation planning process is to provide the information necessary for making decisions on when and where improvements should be made to the transportation system to meet travel demand as developed in an urban area travel demand model as part of the Regional Transportation Plan update process. Metro uses EMME/2, a computer based program for transportation planning, to process the large amounts of data for the Portland Metropolitan area. For the Beaverton TSP, the eastern Washington County area was evaluated at a level of detail consistent with Washington County travel forecast efforts for the 2020 travel through a traversal process and substantially more detail added into the Beaverton area.

Traffic forecasting can be divided into several distinct but integrated components that represent the logical sequence of travel behavior (Figure 4-2). These components and their general order in the traffic forecasting process are as follows:

- Trip Generation
- Trip Distribution
- Mode Choice
- Traffic Assignment

The initial roadway network used in the traffic model was the existing streets and roadways. Future 2020 land use scenarios were tested and roadway improvements were added to mitigate the impacts of motor vehicle traffic growth, using the RTP Priority System and the 2015 Beaverton TSP improvements as a starting basis. Improvements in each of these plans (the RTP and TSP) were validated in the study process. Figures 1-4 and 1-5 show the needed RTP and 2015 Beaverton TSP improvements, respectively. Table 1-7 lists the RTP Priority System and the 2015 Beaverton TSP motor vehicle improvements. Forecasts of PM peak period traffic flows were produced for every major roadway segment within Beaverton. Traffic volumes were projected on all arterials and most collector streets. Some local streets were included in the model, but many are represented by centroid connectors in the model process.

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City of Beaverton
Transportation System Plan

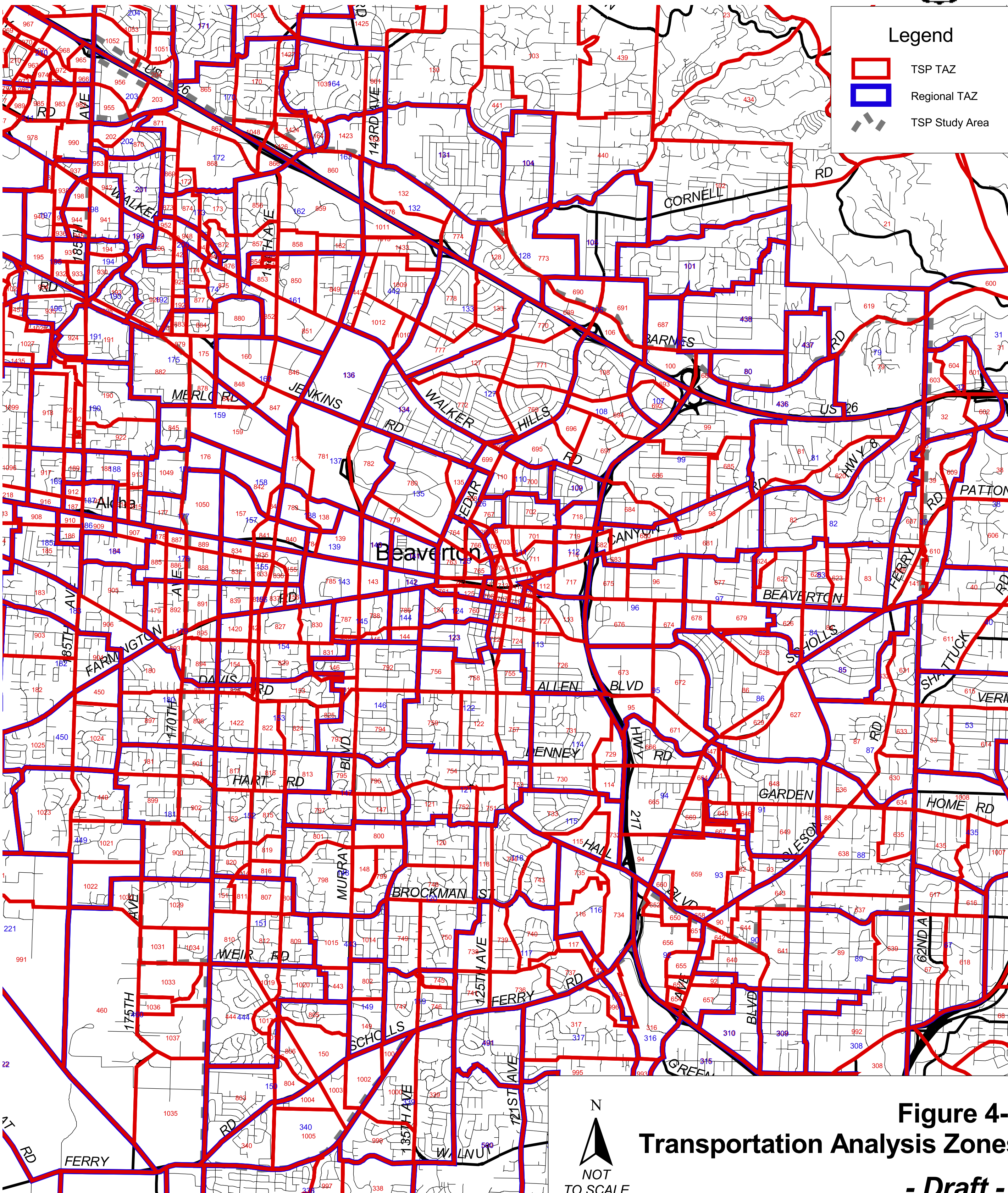

Figure 4-1
Transportation Analysis Zones

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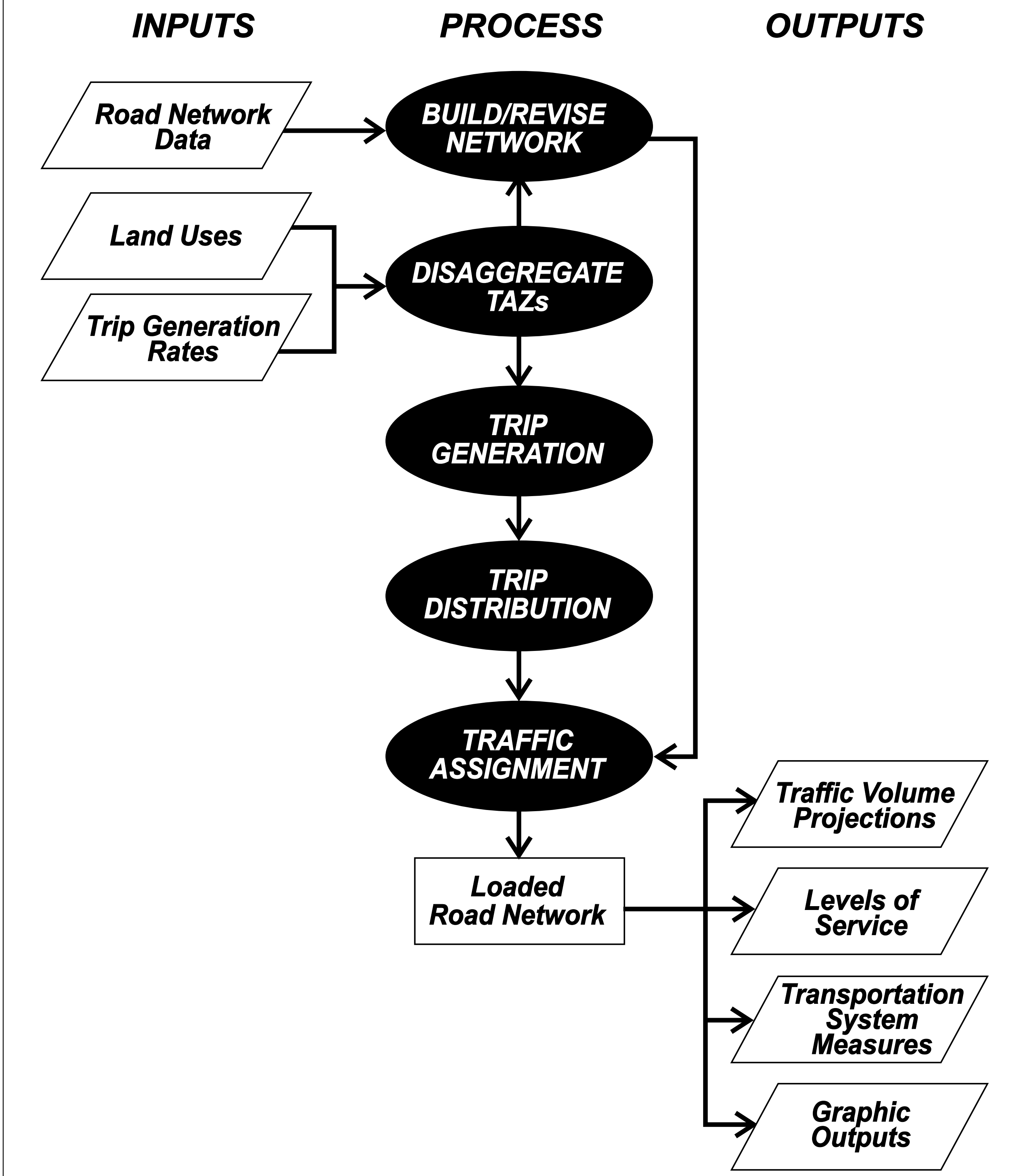

Figure 4-2
MODEL PROCESS

Trip Generation

The trip generation process translates land use quantities (number of dwelling units, retail, and other employment) into vehicle trip ends (number of vehicles entering or leaving a TAZ or sub-TAZ) using trip generation rates established during the model verification process. The Metro trip generation process is elaborate, entailing detailed trip characteristics for various types of housing, retail employment, non-retail employment, and special activities. Typically, most traffic impact studies rely on the Institute of Transportation Engineers (ITE) research for analysis[1]. The model process is tailored to variations in travel characteristics and activities in the region. For reference, Table 4-2 provides a summary of the approximate average evening peak hour trip rates used in the Metro model. These are averaged over a broad area and thus, are different than driveway counts represented by ITE. This data provides a reference for the trip generation process used in the model.

Table 4-2
Approximate Average PM Peak Period Trip Rates Used in Metro Model

	Average Trip Rate/Unit		
Unit	**In**	**Out**	**Total**
Household (HH)	0.43	0.19	0.62
Retail Employee (RET)	0.78	0.69	1.47
Other Employee (OTH)	0.07	0.29	0.36

Source: DKS/Metro

Table 4-3 illustrates the estimated growth in vehicle trips generated within the Beaverton area (the area shown in Figure 4-1) during the PM peak period (2-hr peak) between 1994 and 2020. It indicates that vehicle trips in Beaverton would grow by approximately 50 percent between 1994 and 2020 if the land develops according to Metro's 2020 land use assumptions. Assuming a 26-year horizon to the 2020 scenario, this represents annualized growth rate of about 1.5 percent per year.

Table 4-3
Existing and Future Projected Vehicle Trip Generation
PM Peak 2-Hour Period Vehicle Trips

	1994 Trips	**2020 Trips**
Beaverton TSP study area	148,700	219,400

[1] *Trip Generation Manual*, 6th Edition, Institute of Transportation Engineers, 1997.

Trip Distribution
This step estimates how many trips travel from one zone in the model to any other zone. Distribution is based on the number of trip ends generated in each zone pair, and on factors that relate the likelihood of travel between any two zones to the travel time between zones. In projecting long-range future traffic volumes, it is important to consider potential changes in regional travel patterns. Although the locations and amounts of traffic generation in Beaverton are essentially a function of future land use in the city, the distribution of trips is influenced by regional growth, particularly in neighboring areas such as Portland and Hillsboro as well as unincorporated areas to the north, south, and west of Beaverton. External trips (trips that have either an origin and not a destination in Beaverton or have a destination but not an origin in Beaverton) and through trips (trips that pass through Beaverton and have neither an origin nor a destination there) were projected using trip distribution patterns based upon census data and traffic counts performed at gateways into the Metro area Urban Growth Boundary (UGB) calibration.

Mode Choice
This is the step where it is determined how many trips will be by various modes (single-occupant vehicle, transit, carpool, pedestrian, bicycle, etc.). The 1994 mode splits are incorporated into the base model and adjustments to that mode split may be made for the future scenario, depending on any expected changes in transit or carpool use. These considerations are built into the forecasts used for 2020.

Based upon analysis of the forecasted mode choice in 2020, an analysis was performed to determine the level of non-single occupant vehicle (SOV) mode share in Beaverton. The travel model provides estimates of the various modes of travel that can be generally assessed at the transportation analysis zone level. Figures 4-5 to 4-7 summarize the level of non-SOV mode share estimated for 2020 using the regional travel demand forecast model in comparison to the modal targets established in the RTP through Table 1-3 of the RTP. Generally the areas served by light rail transit and frequent bus service have the highest levels of non-SOV mode use. Table 4-8 summarizes the non-SOV mode share performance in 2020 for the two-hour PM peak in comparison to the 2040 RTP targets. Overall, the 2040 modal targets for the regional center/town center areas is nearly met in 2020 and is within the lower end of the target range for other land use designations.

Traffic Assignment
In this process, trips from one zone to another are assigned to specific travel routes in the network, and resulting trip volumes are accumulated on links of the network until all trips are assigned.

Network travel times are updated to reflect the congestion effects of the traffic assigned through an equilibrium process. Congested travel times are estimated using what are called “volume-delay functions” in EMME/2. There are different forms of volume/delay functions, all of which attempt to simulate the impact of congestion on travel times (greater delay) as traffic volume increases. The volume-delay functions take into account the specific characteristics of each roadway link, such as capacity, speed and facility type. This allows the model to reflect conditions somewhat similar to driver behavior.

Model Verification

The base 1994 modeled traffic volumes were compared against actual traffic volume counts across screenlines, on key arterials, and at key intersections. Most arterial traffic volumes meet screenline tolerances for forecast adequacy. Based on this performance, the model was used for future forecasting and assessment of circulation change.

Model Application to Beaverton

Intersection turn movements were extracted from the model at key intersections for both the base year 1994 and forecast year 2020 scenarios. These intersection turn movements were not used directly, but a portion of the increment of the year 2020 turn movements over the 1994 turn movements was applied (added) to existing (actual 2000) turn movement counts in Beaverton.
A post processing technique is utilized to refine model travel forecasts to the volume forecasts utilized for 2020 intersection analysis. The turn movement volumes used for future year intersection analysis can be found in the technical appendix for the TSP.

Forecasted Future Capacity Deficiencies

The base case analysis for the forecasted 2020 growth was based on the RTP Committed Funding scenario. This scenario only includes transportation system improvements that are expected to be constructed/implemented with the current funding levels. Figure 4-3 shows the forecasted demand/capacity on roadways with the Beaverton 2020 TSP Study Area for the committed scenario. As shown in the figure, the committed scenario transportation system does not have adequate roadway capacity to serve the expected future travel needs. Demand/Capacity (D/C) ratios exceed 1.0 system wide. Table 4-4 lists the forecasted D/C ratios on major roadways in the TSP study area that would exceed standards. To meet performance standards and serve future growth, the future transportation system needs significant multi-modal improvements and strategies to manage the forecasted travel demand.

Table 4-4: Forecasted 2020 D/C ratios (Committed Scenario) 2-Hour

Roadway Section	Forecasted D/C ratio
US 26 from ORE 217 to Canyon Road	1.06
US 26 from Murray Boulevard to Cornell Road	1.10
Bethany Boulevard from US 26 to West Union	1.21
Cornell Road from 143rd Avenue to Saltzman Road	1.14
Walker Road from ORE 217 to Cedar Hills Boulevard*	1.02
Walker Road from Cedar Hills Boulevard to 158th Avenue	1.28
Walker Road from 170th Avenue to 185th Avenue	1.14
Jenkins Road from Murray Boulevard to 158th Avenue	1.96
TV Highway from Watson Boulevard to 170th Avenue	1.36
Farmington Road from Cedar Hills Boulevard to 170th Avenue	1.24
Allen Boulevard from ORE 217 to Murray Boulevard	1.34
Greenway from Hall Boulevard to 125th Avenue	1.21
Scholls Ferry Road from Laurelwood Avenue to Denney Road	1.16
Scholls Ferry Road from ORE 217 to 125th Avenue	1.34
170th Avenue from Bany Road to Merlo Road	1.38
Murray Boulevard from Jenkins Road to Brockman Street	1.40
Cedar Hills Boulevard from Walker Road to Hall Boulevard	1.18
ORE 217 from BH Highway to Scholls Ferry Road	1.14

*Based on Priority Scenario with Walker west of Cedar Hills as 5 lanes

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Transportation System Plan

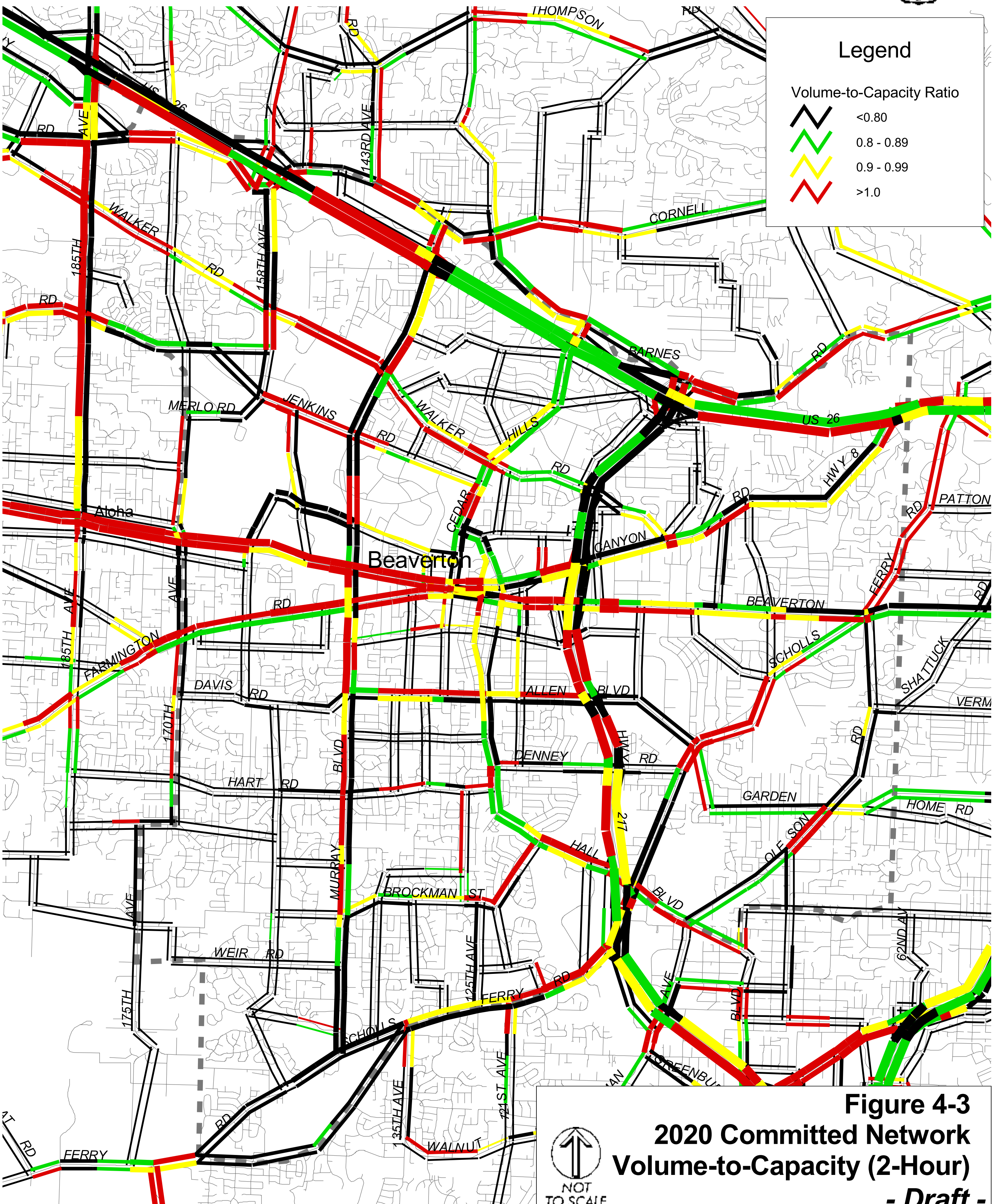

Figure 4-3
2020 Committed Network
Volume-to-Capacity (2-Hour)
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ALTERNATIVE/OPTIONS FOR ADDRESSING FUTURE DEFICIENCIES

The transportation system needs in Beaverton were determined for existing and future conditions. The extent and nature of the multi-modal improvements for Beaverton are significant. The impact of future growth would be severe without significant investment in transportation improvements. This section outlines the type of improvements that would be necessary as part of a long-range master plan. Phasing of implementation will be necessary since all of the improvements cannot be done at once. This will require prioritization of projects and periodic updating to reflect current needs. Most importantly, it should be understood that the improvements outlined in the following sections are a guide to managing growth in Beaverton as it occurs over the next 20 years.

Transportation System Management (TSM) / Transportation Demand Management (TDM)

Transportation System Management
Transportation System Management (TSM) focuses on low cost strategies to enhance operational performance of the transportation system by seeking solutions to immediate transportation problems, finding ways to better manage transportation, maximizing urban mobility, and treating all modes of travel as a coordinated system. These types of measures include such things as signal improvements, ramp metering, traffic calming, access management, intelligent transportation solutions (ITS) and programs that enhance and smooth transit operations. Typically, the most significant measures that can provide tangible benefits to the traveling public are traffic signal coordination and systems.

TSM measures focus primarily on region wide improvements, however there are a number of TSM measures that could be used in a smaller scale environment such as the Beaverton area. The following TSM measures list summarizes strategies that could be appropriate for the Beaverton 2020 TSP study area.

- Traffic monitoring and Surveillance
- Signal coordination and optimization
- Signal priority
- Information availability
- Incident management

Traffic Monitoring and Surveillance
Traditionally, the solution to most congestion problems was to build more roadways or widen the existing facilities. Most recently, it has been realized that urban congestion cannot be managed

by simply building roadway capacity. Better management of the existing transportation network is necessary to help reduce congestion. This also means coordinating among various agencies in the area to create a seamless transportation network.

As a monitoring program, the City of Beaverton and Washington County routinely collect traffic volume data in the Beaverton area. This data is then used as a tool to compare historical growth and determine which transportation corridors in the area are being utilized. This information is useful from a growth perspective, however it is difficult to use this data to help enhance the existing transportation environment on a day-by-day basis.

The use of closed circuit television cameras (CCTV) and vehicle detection systems could be used to help survey the transportation network during peak hours of congestion. Adjustments to signal timing can be made from the central control room to help improve traffic flow and decrease delay. Benefits of traffic monitoring and surveillance include reduced congestion, reduced delay, reduced travel time, faster and more accurate identification of locations of incidents, development of specific signal timing plans based on historic trends and reductions in pollutants and wasted fuel.

Signal Coordination and Optimization

Traffic monitoring and surveillance can only produce a certain amount of enhanced service along a corridor. As future growth occurs, congestion is due to increase. Traffic signal systems that were adequate in the past dealing with AM and PM peak hours will need to adapt to the changing environment and deal with additional time periods of congestion.

The state-of-the-art traffic signal systems, using a central computer to communicate and coordinate timing plans, have proven to produce substantial benefits in reducing congestion and travel time while increasing travel speeds. In the Portland area, examples of this benefit has been seen on such corridors as 82nd Avenue, 122nd Avenue, Martin Luther King Jr. Boulevard and SW Naito Parkway where improved signal timing reduced travel times anywhere from 10% to 25% during peak periods.[2]

The addition of signal optimization helps to maximize the total cycle length of a signal to provide optimal timing patterns for both the main arterial and the side street traffic. This optimization can help to skip side street cycles if there are no vehicles present and help to increase the "green time" of a signal for a major movement. Optimization can provide additional reliability and efficiency for the transportation network.

[2] City of Portland, *Intelligent Transportation System Implementation Plan*, June 1997.

Signal Priority

The provision of signal priority works for both transit vehicles and emergency vehicles. Both operate on the same principles, which are improving the reliability and speed the vehicles. Clearly they serve two different purposes, but the idea benefits mobility for both.

Signal priority is achieved by establishing a communication between the approaching vehicle with the signal. Once the communication between the two is made, the approaching vehicle will direct the traffic signal to lengthen the green time for the light (assuming it is safe to do so) and allow for a "priority" through the intersection. This priority is done only when it will not cause significant impact at the intersection.

Studies indicate that with signal priority transit travel times have decreased from 15% to 18 %, while service reliability has increased 12% to 23% for on-time performance.[3] These improvements can help cost effectiveness for transit operations.

Signal priority can also include "smart recovery" at intersections that currently operate in conjunction with LRT. Once an LRT vehicle has passed through the intersection, the signal phasing would "recover" to the same point it was at before the LRT vehicle passed through. This could reduce the potential for delays at intersections due to LRT.

Information Availability

An uninformed public can make inefficient transportation choices that could place a strain on the limited available capacity of a transportation network. This could create more congestion in an area that is already highly congested. By providing travelers with real-time information, the ability to make a more informed and efficient transportation decision is available.

The variety of information services available today include hand-held devices such as pagers, cell phones and personal data assistants (PDAs), as well as transit kiosks, personalized email reports, radio, tv and the internet. All of these devices are aimed at providing the traveler the best available information for making transportation choices.

There is another type of information availability to help travelers along the roadway. These are message signs that help inform a traveler of delays and/or help the traveler make an informed decision on a travel route. The first type of sign is a variable message sign (VMS). A VMS is a stationary sign that can display various messages. The second type of sign is a changeable message sign (CMS). This type of sign is mobile and can be placed at any location along a corridor to display information.

Currently, there are cameras located on US 26 and ORE 217 that show the conditions on the

[3] *Intelligent transportation system initiatives in Clark County: VAST Program*, January 2001.

freeways. These cameras are Internet accessible and help monitor traffic conditions and inform users of traffic conditions.

Incident Management

Typically incident response is focused on freeways. However, there is also a clear need for incident response on arterials. The time to respond to incidents in an urban area can dramatically affect the level of congestion on a corridor.

Incident management includes detection, verification, response, site management, traffic management, clearance time and recovery. Each of these steps takes time, during which the transportation operations along the corridor decrease. Research indicates that effective incident management has the potential to reduce response times by 40% and decrease fatalities by 10% in urban areas.[4] In addition, incident management has the potential to reduce delay to users and reduce emissions from vehicles.

TSM Summary

All of the previously mentioned measures of TSM can work together in a transportation environment to help reduce congestion and decrease travel times for travelers. Table 4-5 summarizes the RTP projects that support Beaverton TSM. Beyond the RTP designated TSM projects, the City of Beaverton should coordinate with Tri-Met, ODOT, and Washington County in providing signal priority at signalized intersections along rapid or frequent bus routes (TV Highway and Cedar Hills/Hall corridor – approximately 50 intersections) to increase transit efficiently, reduce transit travel times, and promote non-SOV person trips. Signal priority should be activated for transit vehicles that are operating behind schedule. The implementation of additional strategies should be on a case-by-case basis and evaluated as to the effectiveness.

[4] *Intelligent Transportation System Initiatives in Clark County: VAST Program*, January 2001.

Table 4-5: RTP Projects supporting TSM

RTP Project Number	Description	Estimated Cost	Projected Implementation
3016	**Washington County:** Acquire hardware for new traffic operations center and conduct needs analysis	$1,000,000	2000-2005
3061	**TV Highway:** Interconnect signals from 209th Avenue to ORE 217	$1,500,000	2006-2010
3063	**Murray Boulevard:** Signal coordination from TV Highway to Allen	$50,000	2000-2005
6012	**Western Avenue:** Implement TSM improvements between Allen and Canyon Road and extend Western Avenue north to Canyon Road new Walker	$2,500,000	2011-2020
6025	**Scholls Ferry Road:** Implement appropriate TSM strategies, from ORE 217 to 125th Avenue, such as signal interconnects, signal re-timing and channelization to improve traffic flows	$500,000	2000-2005

Source: *Regional Transportation Plan,* Metro, August 2000.

Transportation Demand Management

Transportation Demand Management (TDM) is the general term used to describe any action that removes single occupant vehicle trips from the roadway network during peak travel demand periods. As growth in the Beaverton area occurs, the number of vehicle trips and travel demand in the area will also increase. The ability to change a users travel behavior and provide alternative mode choices will help accommodate this growth.

Generally, TDM focuses on reducing vehicle miles traveled and promoting alternative modes of travel for large employers of an area. This is due in part to the Employee Commute Options (ECO) rules that were passed by the Oregon Legislature in 1993 to help protect the health of Portland area residents from air pollution and to ensure that the area complied with the Federal Clean Air Act.[5]

Research has shown that a comprehensive set of complementary policies implemented over a large geographic area can have an effect on the number of vehicle miles traveled to/from that area.[6]

[5] Oregon Administrative Rules, Chapter 340, Division 30.

[6] *The Potential for Land Use Demand Management Policies to Reduce Automobile Trips*, ODOT, by ECO Northwest, June 1992.

However, the same research indicates that in order for TDM measures to be effective, they should go beyond the low-cost, uncontroversial measures commonly used such as carpooling, transportation coordinators/associations, priority parking spaces, etc.

The more effective TDM measures include elements related to parking and congestion pricing, improved services for alternative modes of travel, and other market-based measures.

However, TDM includes a wide variety of actions that are specifically tailored to the individual needs of an area. Table 4-6 provides a list of several strategies outlined in the ECO program that could be applicable to the Beaverton area.

Table 4-6
Transportation Demand Management Strategies

Strategy	Description	Potential Trip Reduction
Telecommuting	Employees perform regular work duties at home or at a work center closer to home, rather than commuting from home to work. This can be full time or on selected workdays. This can require computer equipment to be most effective.	82-91% (Full Time) 14-36% (1-2 day/wk)
Compressed Work Week	Schedule where employees work their regular scheduled number of hours in fewer days per week.	7-9% (9day/80hr) 16-18% (4day/40hr) 32-36% (3day/36hr)
Transit Pass Subsidy	For employees who take transit to work on a regular basis, the employer pays for all or part of the cost of a monthly transit pass.	19-32% (full subsidy, high transit service) 2-3% (half subsidy, medium transit service)
Cash Out Employee Parking	An employer that has been subsidizing parking (free parking) discontinues the subsidy and charges all employees for parking. An amount equivalent to the previous subsidy is then provided to each employee, who then can decide which mode of travel to use.	8-20% (high transit service available) 5-9% (medium transit services available) 2-4% (low transit services available)
Reduced Parking Cost for HOVs	Parking costs charged to employees are reduced for high occupancy vehicles (HOV) such as carpools and vanpools.	1-3%
Alternative Mode Subsidy	For employees that commute to work by modes other than driving alone, the employer provides a monetary bonus to the employee.	21-34% (full subsidy of cost, high alternative modes) 2-4% (half subsidy of cost, medium alternative modes)
Bicycle Program	Provides support services to those employees that bicycle	0-10%

Strategy	Description	Potential Trip Reduction
	to work. Examples include: safe/secure bicycle storage, shower facilities and subsidy of commute bicycle purchase.	
On-site Rideshare Matching for HOVs	Employees who are interested in carpooling or vanpooling provide information to a transportation coordinator regarding their work hours, availability of a vehicle and place of residence. The coordinator then matches employees who can reasonably rideshare together.	1-2%
Provide Vanpools	Employees that live near each other are organized into a vanpool for their trip to work. The employer may subsidize the cost of operation and maintaining the van.	15-25% (company provided van with fee) 30-40% (company subsidized van)
Gift/Awards for Alternative Mode Use	Employees are offered the opportunity to receive a gift or an award for using modes other than driving alone.	0-3%
Walking Program	Provide support services for those who walk to work. This could include buying walking shoes or providing lockers and showers.	0-3%
Company Cars for Business Travel	Employees are allowed to use company cars for business-related travel during the day	0-1%
Guaranteed Ride Home Program	A company owned or leased vehicle or taxi fare is provided in the case of an emergency for employees that use alternative modes.	1-3%
Time off with Pay for Alternative Mode Use	Employees are offered time off with pay as an incentive to use alternative modes.	1-2%

Source: *Guidance for Estimating Trip Reductions from Commute Options*, Oregon Department of Environmental Quality, August 1996.

Redevelopment in the Beaverton area will also allow for TDM friendly development. Setting TDM goals and policies for new development will be necessary to help implement TDM measures in the future.

With many regional trips destined to, or traveling through, the Beaverton area, region wide TDM measures should help to reduce congestion. Metro has established non-SOV (Single Occupancy Vehicle) mode share targets by 2040 for regional centers (similar to Gateway). These targets may also serve as performance measures for areas that have been designated as "Areas of Special

Concern" (Beaverton Regional Center is classified by Metro as this type of area).[7] The 2040 non-SOV model target for regional centers, town centers, LRT communities, main streets, and corridors is 45-55%.[8]

The Metro 2020 Regional Demand Model provides an analysis tool for monitoring non-SOV trip percentages between the various RTP funding scenarios. The forecasted non-SOV trip percentages take into account all RTP improvement projects (including transit, pedestrian, and bicycle system improvements), as well as the TAZ performance factors listed in Table 4-7 (see Appendix G for specific transit route frequency improvements). Parking factors are based on a ratio of parking costs in comparison to a South/North Draft Environmental Impact Study (DEIS) parking survey (for example, in the RTP Priority System a person parking in the Beaverton Regional Center would pay 30% more than a person parking in the Washinton Square Regional Center). Transit Pass factors represent the amount of full transit fare that a transit rider is expected to pay (considering ECO rule and discount downtown fares). Fareless areas assume that fareless transit areas will be developed in the identified 2040 concept areas.

Table 4-7: TDM Assumptions for 2040 Land Use Designations in Beaverton

(P) 2020 Preferred System
(S) 2020 Strategic/Priority System
(FC) 2020 Existing Resources System (roughly equivalent to the committed system)

2040 Grouping	Group Characteristics	Parking Factors			Transit Pass Factor			Fareless Areas		
		P	S	FC	P	S	FC	P	S	FC
Regional Centers - Tier 1 Beaverton	Planned high employment and housing density, with highest level of access by all modes. LRT exists and current land uses approach planned mix and densities.	1.60	1.20	0.80	70%	75%	80%	X	X	X
Regional Centers - Tier 2 Washington Square	Planned high employment and housing density, with highest level of access by all modes; planned LRT. Current land uses do not reflect planned mix and densities.	1.22	0.92	0.60	85%	90%	95%	X	X	
Station Communities Tier 1 Westside Corridor	High housing density mixed with commercial services; highest level of access for transit, bike and walk; existing LRT.	1.60	1.20	0.80	70%	75%	80%			
Town Centers - Tier 2 West Portland Raleigh Hills Hillsdale Sunset	Moderate housing and employment density planned, with high level of access by all modes. Currently has some mix of uses, moderately connected street system and some transit. Existing topography or physical barriers may limit bike and	0.72	0.54	0.36	90%	95%	100%			

7 Based on the *2000 Metro Regional Transportation Plan*, Ordinance No. 00-869A (August 10, 2000), page 1-32.

8 Based on the *2000 Metro Regional Transportation Plan*, Ordinance No. 00-869A (August 10, 2000), page 1-62.

2040 Grouping	Group Characteristics	Parking Factors			Transit Pass Factor			Fareless Areas		
	pedestrian travel.									
Town Centers - Tier 3 Farmington Cedar Mill Tannasbourne	Moderate housing and employment density planned, with high level of access by all modes. Currently has modest mix of uses, poorly connected street system and poor transit. Existing topography or physical barriers may limit bike and pedestrian travel.	0.55	0.41	0.28	100%	100%	100%			
Town Centers - Tier 4 Bethany Murrayhill	Moderate housing and employment density planned, with high level of access by all modes. Currently undeveloped or developing urban uses, with skeletal street system and poor transit. Existing topography or physical barriers may limit bike and pedestrian travel.	0.36	0.27	0.18	100%	100%	100%			
Mainstreets - Tier 2 Remaining Region	Moderate housing and employment density planned, with high level of access by all modes. Currently has some mix of uses, moderate connectivity and some transit.	0.72	0.54	0.36	100%	100%	100%			
Corridors Full Region	Moderate housing and employment density planned, with high level of access by all modes. Currently has modest mix of uses, moderate connectivity and some transit.	None	None	None	100%	100%	100%			
Inner Neighborhoods Full Region	Low density housing planned, with moderate level of access by all modes. Currently has moderate connectivity and some transit.	None	None	None	100%	100%	100%			
Outer Neighborhoods - Tier 1 Current Urban Areas	Low density housing planned, with moderate level of access by all modes. Currently has poorly connected street system and little transit.	None	None	None	100%	100%	100%			
Employment Areas Full Region	Low density employment planned, with moderate level of access by all modes. Currently has poorly connected street system and limited transit.	None	None	None	100%	100%	100%			
Industrial Areas - Tier 2 Beaverton Sunset	Low density employment planned, with high level of access by rail and truck freight, and moderate access by other modes. Currently has developing street system and poor transit.	None	None	None	100%	100%	100%			

The RTP (in RTP Table 1-3) outlines non-SOV (Single Occupancy Vehicle) targets for the year 2040 for the Portalnd region. Analysis of the Metro 2020 forecast model indicates non-SOV trip percentages for the Beaverton Area (summarized in Table 4-8). The 2020 Priority system forecasted rates indicate that the significant investment in transportation improvements will, in general, achieve a three percent reduction in SOV trips in the Beaverton area, compared to the committed funding scenario. Figures 4-4 to 4-6 show the non-SOV trip percentages by Metro TAZ for the committed, priority, and priority minus committed scenarios.

Table 4-8:
Forecasted non-SOV shares in the Beaverton TSP Study Area

Area	2020 RTP Committed System Model Rate	2020 RTP Priority System Model Rate	2040 Metro Goal
Overall TSP Study Area	33%	36%	N/A
2040 Design Type: ▪ Regional Centers ▪ Town Centers ▪ LRT Communities ▪ Main Streets ▪ Corridors	34%	37%	45-55%
2040 Design Type: ▪ Industrial areas ▪ Intermodal facilities ▪ Employment areas ▪ Inner neighborhoods ▪ Outer neighborhoods	32%	35%	40-45%

Source: 2020 Metro Regional Travel Demand Model
2000 Metro Regional Transportation Plan

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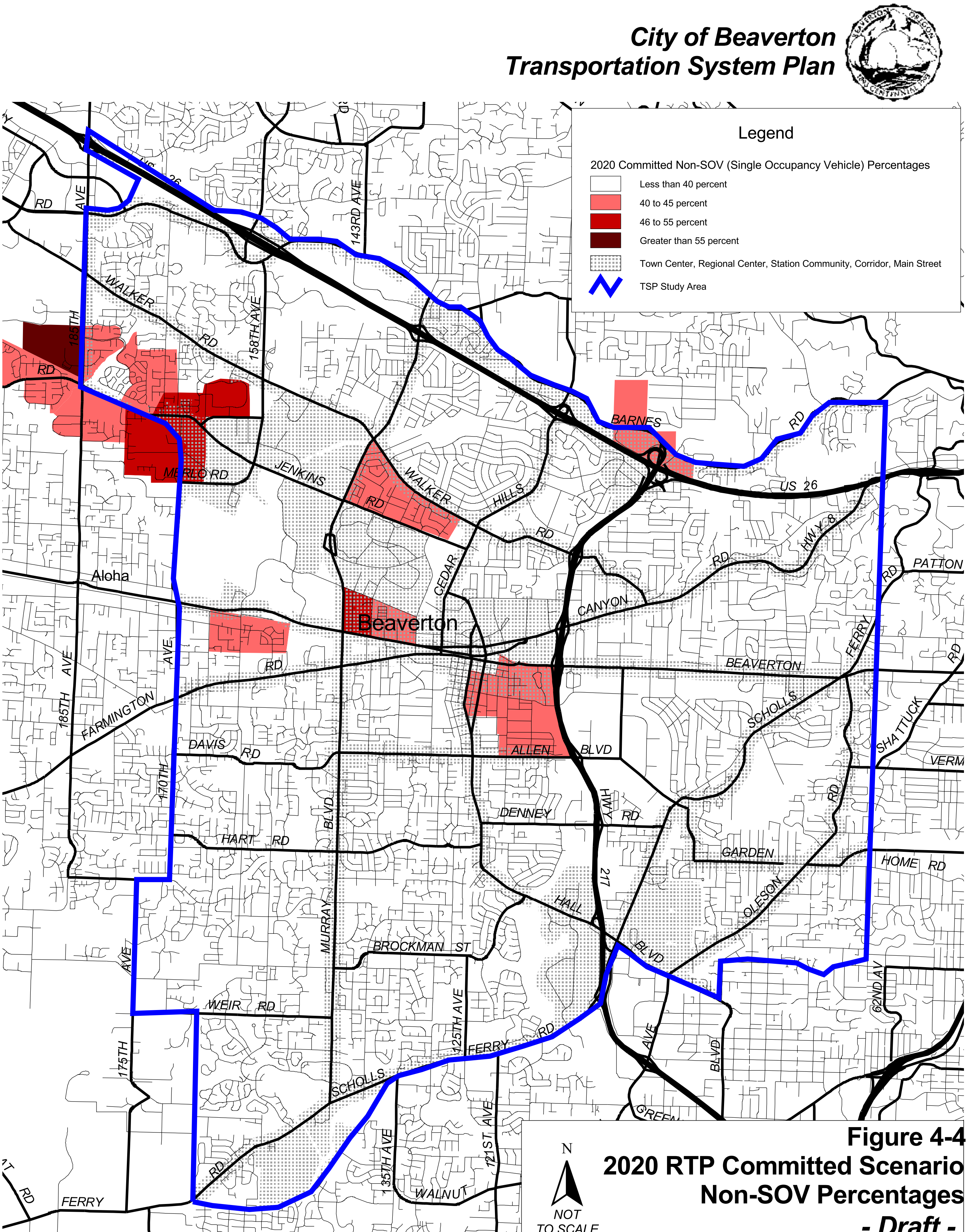

Figure 4-4
2020 RTP Committed Scenario
Non-SOV Percentages
- Draft -

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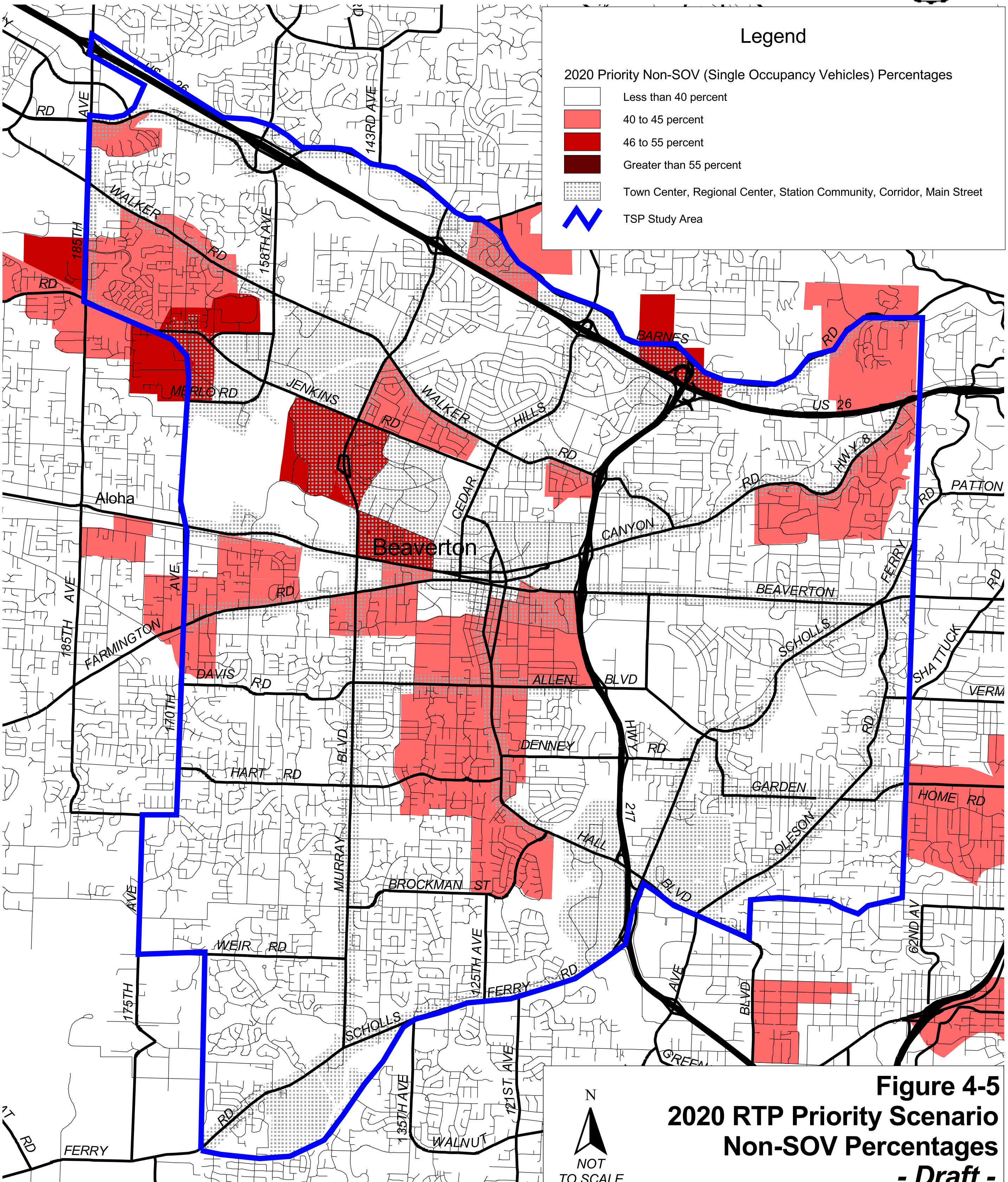

Figure 4-5
2020 RTP Priority Scenario
Non-SOV Percentages
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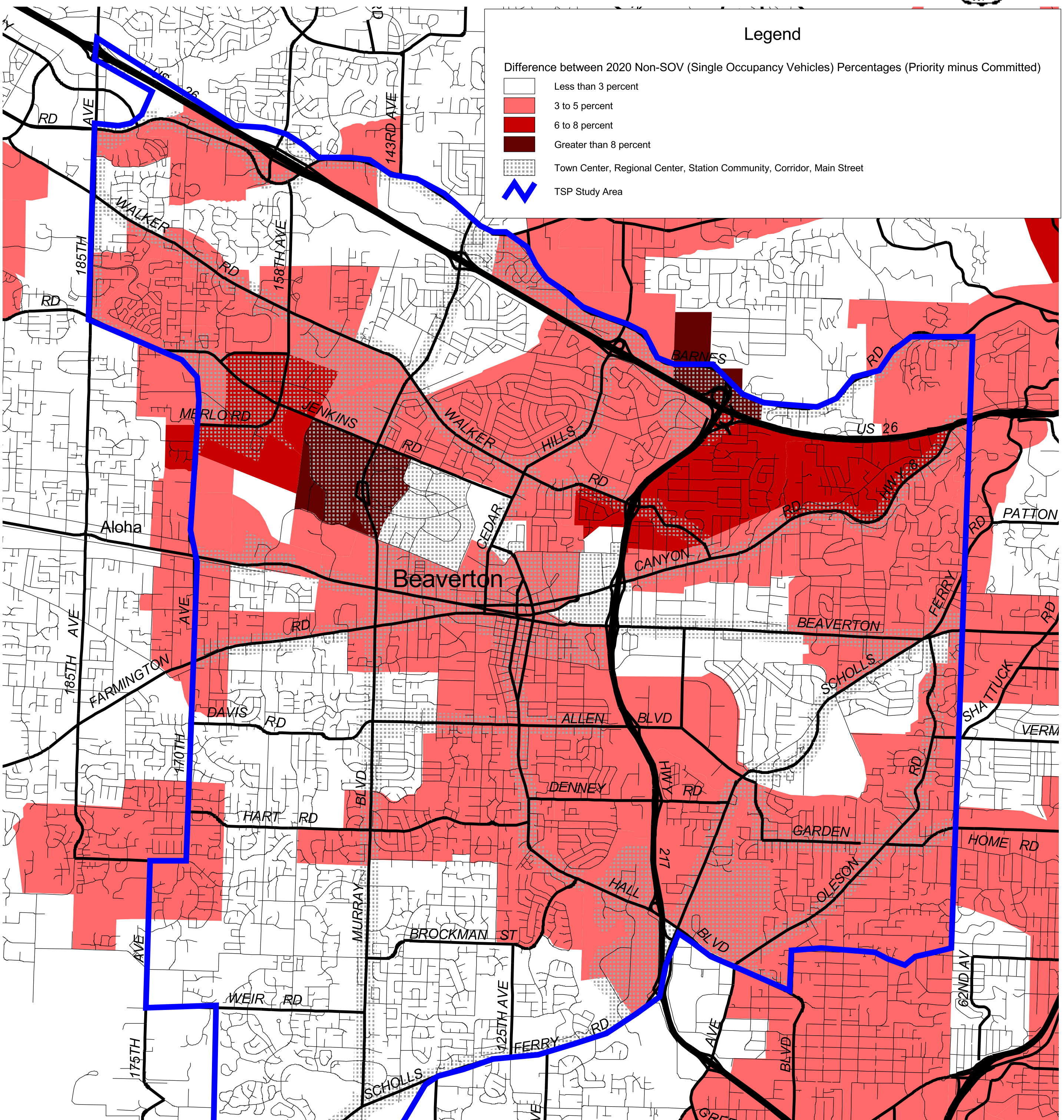

Figure 4-6
Growth in Non-SOV use between Committed and Priority RTP Scenarios
- Draft -

The forecasted non-SOV percentages can only be achieved with significant improvements to the transportation system and implementation of trip reduction strategies. The City of Beaverton should coordinate with Washington County, the Westside Transportation Alliance, and Tri-Met to implement strategies to esure TDM assumptions in the RTP are implemented, including development of a downtown fareless transit area and reduced transit fare program and implementation of the downtown connectivity plan and regional center parking plan. The City of Beaverton, Washington County, and Tri-Met should coordinate to implement the pedestrian, bicycle, and transit system improvements, which offer alternative modes of travel. The following City of Beaverton goals and policies, which have been revised in the TSP Update process, pertain specifically to making progress toward achieving non-SOV modal targets:

6.2.4. **Goal**: An efficient transportation system that reduces the percentage of trips by single occupant vehicles, reduces the number and length of trips, limits congestion, and improves air quality.

Policies:

a) Support and implement trip reduction strategies developed regionally, including employment, tourist, and recreational trip reduction programs.

__Actions__: Encourage implementation of travel demand management programs. Work to shift traffic to off-peak travel hours. Coordinate trip reduction strategies with Washington County, Metro, Westside Transportation Alliance, Oregon Department of Transportation, Tri-Met, neighboring cities, and the Oregon Department of Environmental Quality. Seek to raise PM peak average vehicle occupancy (AVO) to 1.3 AVO or more in the evening peak and/or move 50 percent or more of the standard evening peak trip generation outside the peak hour. Educate business groups, employees, and residents about trip reduction strategies. Work with business groups, residents, and employees to develop and implement travel demand management programs. Support and implement strategies that achieve progress toward attaining Metro's 2040 Regional Non-Single Occupant Vehicle Modal Targets. 2040 Non-SOV Modal Targets are as follows:

Beaverton Regional Center: 45-55%;
Murray/Scholls Town Center: 45-55%;
Beaverton Main Streets, Station Communities, and Corridors: 45-55%
Beaverton Industrial Areas, Intermodal Facilities, Employment Areas, Inner and Outer Neighborhoods: 40-45%
(Targets apply to trips to, within, and out of each 2040 Design Type. The targets reflect conditions appropriate for the year 2040 and are needed to comply with Oregon Transportation Planning Rule objectives to reduce reliance on single-occupancy vehicles.)

Continue to implement the following action plan to work toward achieving these targets:

i) Encourage development that effectively mixes land uses to reduce vehicle trip generation.

ii) Develop consistent conditions for land use approval that require future employment related land use developments to agree to reduce peak hour trip making through transportation demand management strategies.

iii) Support efforts by Washington County, Oregon Department of Transportation, Department of Environmental Quality, Tri-Met, and the Westside Transportation Alliance to develop productive demand management measures that reduce vehicle miles traveled and peak hour trips.

iv) Coordinate with Oregon Department of Transportation and Tri-Met on the development of park and rides at transit stations or freeway interchange locations. Interchange reconstruction projects should be required to identify potential park and ride sites.

v) Build on existing Regional Center average transit pass discount percentage to achieve a 25 percent discount by 2020.

vi) Work with Washington County, Westside Transportation Alliance, and Tri-Met to develop and implement a downtown fareless transit area, a regional center transportation management agency, and reduced transit fare programs, based on increased demand and funding availability.

vii) Implement the bicycle, transit, pedestrian, and motor vehicle master improvement plans to implement a convenient multimodal transportation system.

b) Limit the provision of parking to meet regional and State standards.

***Actions**: Work to reduce parking per capita per Metro and State requirements, while minimizing impacts to neighborhoods. Implement the motor vehicle and bicycle parking ratios in new development. Develop and implement a Regional Center parking plan and a residential parking permit program as demand increases. Continue to implement shared parking and timed parking through new development and existing programs. Work toward implementing other parking-based transportation demand management strategies such as metered and structured parking to help achieve Metro's 2040 Non-SOV mode split targets.*

c) Maintain levels of service consistent with Metro's Regional Transportation Plan and the Oregon Transportation Plan. Reduce traffic congestion and enhance traffic flow through such measures as intersection improvements, intelligent transportation systems, signal synchronization, and other similar measures.

***Action:** Adopt level of service standards that are consistent with regional and State standards.*

d) Plan land uses to increase opportunities for multi-purpose trips (trip chaining).

Actions: Encourage residents to reduce cold starts, miles traveled, and air quality degradation by combining several trips into one. Encourage mixed use where allowed to reduce vehicle trips and promote trip chaining.

e) Require land use approval of proposals for new or improved transportation facilities. The approval process shall identify and consider the project's identified impacts.

f) Support mixed-use development where zoning allows.

g) Work with Tri-Met to encourage the development of transit improvements, improve access and frequency of service, and increase ridership potential and service area. Encourage development of regional high capacity transit, including light rail transit and commuter rail.

Action: *Support commuter rail and its associated supportive transit services.*

Several TDM strategies were developed in the 2015 TSP that are aimed at achieving the Metro 2040 non-SOV targets. The ranking of the strategies follows from most important to least important:

- Encourage linkage of housing, retail, and employment centers
- Provide incentives to take transit and use other modes (i.e., free transit pass)
- Flexible working hours
- Schedule deliveries outside of peak hours
- Coordinate shift changes/staggered work hours
- Telecommuting
- Participate in Westside Transportation Alliance
- Provide information regarding commute options to larger employers
- Work with property owners to install bicycle racks and bicycle amenities

The 2015 TSP recommended TDM plan, along with multi-modal improvements, should help the City of Beaverton achieve the Metro 2040 non-SOV targets and comply with state, regional, and county policy. The recommended action plan for the City of Beaverton remains as the following:

- Encourage development that effectively mixes land uses to reduce vehicle trip generation. These plans may include development of linkages (particularly non-auto) that support greater use of alternative modes. Land use density should be higher at transit stations (half mile radius) than elsewhere in the community.
- Develop consistent conditions for land use approval that require all future employment related land use developments to agree to reduce peak hour trip

making, through individual or collective TDM efforts. For example, measures which are appropriate for site planning such as close-in parking for carpools, bicycle parking, shower facilities, and convenient transit stops should be considered in the design review process.

- Support continued efforts by Washington County, ODOT, DEQ, Tri-Met, and the Westside Transportation Alliance to develop productive TDM measures that reduce VMT and peak hour trips, including investigating transit pass programs with city employers and implementing a fareless area in the downtown regional center (there are currently 46 employers in Beaverton with transit pass programs, two of which are in the regional center). This may require City funding of TDM management to get maximum benefit or results (possibly $25,000 to $75,000 per year).
- As a capital oriented element, coordinate with ODOT and Tri-Met on the development of park-and-ride transit station or freeway interchange locations in Beaverton (these are locations proven to be successful in attracting carpool/transit use). The Transit Master Plan, Figure 4-9, shows current park-and-ride locations. Expansion of these sites should focus on transit station or freeway interchange locations. Interchange reconstruction projects should be required to identify potential sites for park-and-ride (even small sites of 50 spaces). Over the next 20 years, a reasonable budget for park-and-ride expansion might be about $100,000 per year (about 50 spaces a year, assuming pre-existing ROW).
- Continued implementation of motor vehicle and bicycle minimum and maximum parking ratios for new development (per Development Code 60.20).
- Implementation of downtown connectivity plan as well as local street connectivity improvements identified in Appendix E.
- Implementation of bicyle, pedestrian, motor vehicle and transit system action plan.

Pedestrians

The existing pedestrian system network map was updated from the previous TSP to reflect recent improvements and the expanded TSP Study Area. In most cases sidewalk improvements are aimed at closing gaps in the existing sidewalk network to provide connectivity rather than capacity. In other words, it is much more important that a continuous sidewalk be available than it be of a certain type or size.

The 2000 Regional Transportation System Plan (RTP) includes designations for pedestrian districts and transit/mixed use corridors (see Figure 4-7). The RTP defines pedestrian districts as areas of high or potentially high pedestrian activity where regional policy places priority on creating a safe, direct, and attractive pedestrian environment. In general, these are areas planned for compact, mixed-use development served by transit and correspond to the following 2040 design type designations within the City of Beaverton: regional centers, town centers, and light rail communities. The corresponding areas within the City of Beaverton include the Murray/Scholls Town Center, the Washington Square Regional Center, downtown Beaverton, and the LRT communities. Areas such as these areas are characterized by buildings oriented to the street and by boulevard street design features such as wider sidewalks with buffering from traffic, marked street crossing at intersections, pedestrian-scale lighting, benches, bus shelters, and street trees. Transit/mixed-use corridors are defined as priority areas for pedestrian travel that are served by good quality transit service and that will generate substantial pedestrian traffic near neighborhood-oriented retail development, schools, parks, and bus stops. These corridors should include such design features as wide sidewalks with buffering from traffic, pedestrian scale-lighting, benches, bus shelters, and street trees. The 2040 design type designation for transit/mixed-use corridors is “Corridors”. The corresponding corridor areas within the City of Beaverton include TV Highway-Canyon Road, BH Highway-Farmington Road, Murray Boulevard, Cedar Hills Boulevard, Hall Boulevard, and Walker Road. As shown in Figure 1-1, the Pedestrian Facilities Master Plan identifies improvements to provide a connected pedestrian network to and within the RTP designated pedestrian districts and transit/mixed use corridors. The City of Beaverton Development Code regulations should require new development in the pedestrian districts and transit/mixed use corridors to comply with the RTP descriptions listed above.

The most important existing pedestrian need in Beaverton is a well-connected pedestrian system within a half-mile grid and connectivity to light rail transit (LRT) stations and key centers in Beaverton (parks, schools, retail, etc.). Needs include safe, direct and convenient access to transit and crossings of large arterial streets which act as barriers to pedestrian movement, marked crossings at major transit stops, as well as an inventory of local street sidewalk locations in order to complete a detailed sidewalk connectivity plan. A well connected pedestrian system in the pedestrian districts and transit/mixed use corridors will insure direct and logical pedestrian crossing at transit stops. The City of Beaverton should coordinate with Washington County, Tri-Met, Metro, and ODOT to ensure that major transit stops will be located at sites with a signalized and/or marked pedestrian crossing. In the future, pedestrian needs will be similar in the City, but there will be additional activity centers that will need to be considered and interconnected. The ranking of pedestrian strategies has not changed from the previous TSP and is listed from most important to least important:

- Connect key pedestrian corridors to schools, parks, recreational uses and activity centers (public facilities, commercial areas, etc.)
- Fill in gaps in the network where some sidewalks exist
- Pedestrian corridors to transit stations and stops
- Signalized pedestrian crossings
- Pedestrian corridors that connect neighborhoods
- Improve streets having sidewalks on one side to two sides
- As development occurs, construction of sidewalks by developers
- Pedestrian corridors that commuters might use
- Reconstruct all existing substandard sidewalks to the City of Beaverton Standards

The Pedestrian Master Plan (Figure 4-7) is an overall plan and summarizes the desired framework plan to meet local and regional policy. The more specific, shorter-term Action Plan was updated to include completed improvements and the expanded study area, as well as projects from the Regional Transportation System Plan (RTP) that were not in the previous TSP Pedestrian Action Plan. The Action Plan (Table 4-9) consists of projects that the City or responsible agency could give priority to when funding becomes available. As development occurs, streets are rebuilt, and other opportunities (such as grant programs) arise, projects on the Master Plan should be pursued as well. In addition, all development projects should include an inventory of local street sidewalk conditions in order to populate the City database of sidewalk locations. Table 4-10 lists pedestrian system improvement projects that have committed funds.

Table 4-9: Pedestrian Action Plan

Project	From	To	Approximate Cost ($1000's dollars)
Priority: Connect key pedestrian corridors to schools, parks, recreational uses and activity centers			
155th Avenue	Davis Road	Nora-Beard Road	410
US 26/Bethany Trail Crossing	US 26	US 26	100
Study US 26 Trail Crossings	143rd Avenue	Canyon Road	80
Study and Improve unsignalized trail crossing of roadways	City jurisdiction		10,000
Link Fanno Creek Path over ORE 217 at Denney	ORE 217	ORE 217	100
Study Fanno Creek Path	Rock Creek	Fanno Creek Greenway	80
Priority: Fill in gaps in pedestrian network			
TV Highway/Canyon Road (gaps on one-side)	Murray Blvd	170th Avenue	470
TV Highway/Canyon Road (Boulevard Design)	ORE 217	Murray Blvd	8,000
Canyon Road/TV Highway (sidewalks and crossings)	91st Avenue	ORE 217	1,465
Canyon Road	US 26	110th Avenue	6,750
Cedar Hills Boulevard	Butner Road	US 26 WB off ramp	124
Murray Boulevard (gaps on one side)	Jenkins Road	Millikan Way	100
Murray Boulevard (gaps)	Farmington	TV Highway	112
Denney Road	Nimbus Avenue	Scholls Ferry Road	241
Allen Boulevard (gaps)	Western Avenue	Scholls Ferry Road	69
Western Avenue	5th Street	800 feet south of 5th	55
Division Street	149th Avenue	170th Avenue	365
Davies Road (east side)	Scholls Ferry Road	Hiteon Drive	76
Scholls Ferry Road (gaps)	Barrows Road (west end)	Beaverton-Hillsdale Highway	1,893
Scholls Ferry Road	BH Highway	Raleighwood Way	151
SW Park Way (gaps)	Walker Road	ORE 217	213
Cornell Road (gaps)	158th Avenue	US 26 WB off ramp	101

Project	From	To	Approximate Cost ($1000's dollars)
Barnes Road	Tuefel Lane	Viewmont Drive	118
Garden Home Road	77^{th} Avenue	76^{th} Avenue	43
Multnomah Boulevard	Garden Home Road	Wash. County line	198
92^{nd} Avenue	Allen Boulevard	Garden Home Road	302
Garden Home Road (gaps one-side)	92^{nd} Avenue	77^{th} Avenue	242
Hall Boulevard	Cascade Avenue	ORE 217 SB ramp	23
Hall Boulevard (gaps one-side)	ORE 217 SB ramp	Approximately 470 ft. west of ramp	34
Barnes Road (gaps one-side)	117^{th} Avenue	Stark Street	104
Barnes Road	Stark Street	Approximately 100 ft. west of Stark St.	14
Cornell Road (gaps one side)	Approximately 500 ft west of Science Park Dr.	Approximately 500 ft east of 153^{rd} Ave.	101
110^{th} Avenue (gap-one side)	Beaverton-Hillsdale Hwy	Canyon Road	34
Priority: Pedestrian corridors to transit stations and stops			
160^{th} Avenue	TV Highway	Davis Road	358
117^{th} Avenue (gaps-one side)	Light Rail Transit Line	Center Street	34
Downtown Beaverton Connectivity collector roadways	Hocken Avenue/ TV Highway	110^{th} Avenue/ Cabot Street	1,033
Pedestrian Access to MAX	LRT Stations		1,148
Priority: Construct sidewalks with roadway improvement projects*			
125^{th} Avenue	Hall Boulevard	Brockman Road	193
Hall Boulevard	Cedar Hills	Hocken/Terman	Part of road improv.
Farmington Road	172^{nd} Avenue	185^{th} Avenue	218
Nimbus Avenue	Denney Road	Cirrus Drive	138
Walker Road	ORE 217	Canyon Road	209
Walker Road (gaps)	173^{rd} Avenue	Mayfield Avenue	441
Davies Road	Scholls Ferry Road	Barrows Road	61
Murray Boulevard	Scholls Ferry Road	Barrows Road	110
170^{th} Avenue	Alexander Street	Baseline/Jenkins	366

Project	From	To	Approximate Cost ($1000's dollars)
173rd Avenue	Cornell Road	Bronson Road	55
Hart Road (gaps)	Hall Boulevard	Murray Boulevard	49
Cornell Road (one-side)	158th Avenue	185th Avenue	165
Oak Street/Davis Road/Allen (gaps)	160th Avenue	170th Avenue	244
Allen Boulevard (gaps)	Alice Lane	Western Avenue	112
Nora-Beard Road	175th Avenue	155th Avenue	281
Weir Road	175th Avenue	160th Avenue	248
175th Avenue-Rigert Road	170th Avenue	Scholls Ferry Road	755
Jenkins Road	153rd Avenue	Murray Boulevard	112
Hart Road/Bany Road (gaps)	170th Avenue	185th Avenue	214
SW Beaverton collector roadway	Scholls Ferry Road	175th Avenue	346
Johnson Street Extension	170th Avenue	209th Avenue	Part of road improv.
Barnes Road Improvements	Highway 217	119th Avenue	Part of road improv.
Barnes Road Improvements	Saltzman Road	119th Avenue	Part of road improv.
Cornell Road Improvements	US 26	143rd Avenue	Part of road improv.
Cornell Road Improvements	143rd Avenue	Saltzman Road	Part of road improv.
Cornell Road Boulevard Improvements	Barnes Road	Trail Street	2,295
Murray Boulevard Improvement	Science Park Drive	Cornell Road	Part of road improv.
Oleson Road	Fanno Creek	Hall	Part of road improv.
ORE 217 Overcrossing roadway	Scholls Ferry Road	Nimbus	Part of road improv.
Murray/Scholls Ferry Town Center – extensions and new roadways			Part of road improv.
103rd Avenue	Walker Road	Western Boulevard	Part of road improv.
SW Beaverton circulation roadway	High Hill Lane	Nora-Beard Road	275
Priority: Pedestrian corridors that connect neighborhoods			
SW Butner Road (one side)	Murray Boulevard	Park Way	296
SW Downing Road (gaps on south side)	Murray Boulevard	Meadow Drive	41
Meadow Drive (one side)	Downing Road	Walker Road	38
Laurelwood Avenue/87th Avenue	Canyon Road	Scholls Ferry Road	434
Jamieson Road	Pinehurst Drive/Cypress	Scholls Ferry Road	206

Project	From	To	Approximate Cost ($1000's dollars)
Cypress Street	Jamieson Road	Elm Avenue	79
Sexton Mountain Drive (gaps)	Maverick Terrace	Nora-Beard Road	296
91st Avenue	Canyon Road	BH Highway	1,970
96th Avenue (one side)	Canyon Road	Beaverton-Hillsdale Highway	90
Pedestrian Action Plan Projects Total Cost:			**$ 45,078**

*Sidewalks to be built with roadway improvement projects are dependent on the ROW and alignment of the road improvement and would not be built without the road improvement

Table 4-10: Pedestrian Action Plan – Projects with Committed Funds

Project	From	To	Approximate Cost ($1000's dollars)
Priority: Connect key pedestrian corridors to schools, parks, recreational uses and activity centers			
170th Avenue	Rigert Road	Alexander Street	515
170th/173rd Avenue	Baseline/Jenkins	Walker Road	220
Millikan Way	Hocken Avenue	Cedar Hills Blvd	57
Hart Road/Bany Road (gaps)	Murray Boulevard	170th Avenue	236
Pedestrian Improvement Project Committed Funds Total Cost:			**$ 1,028**

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Transportation System Plan

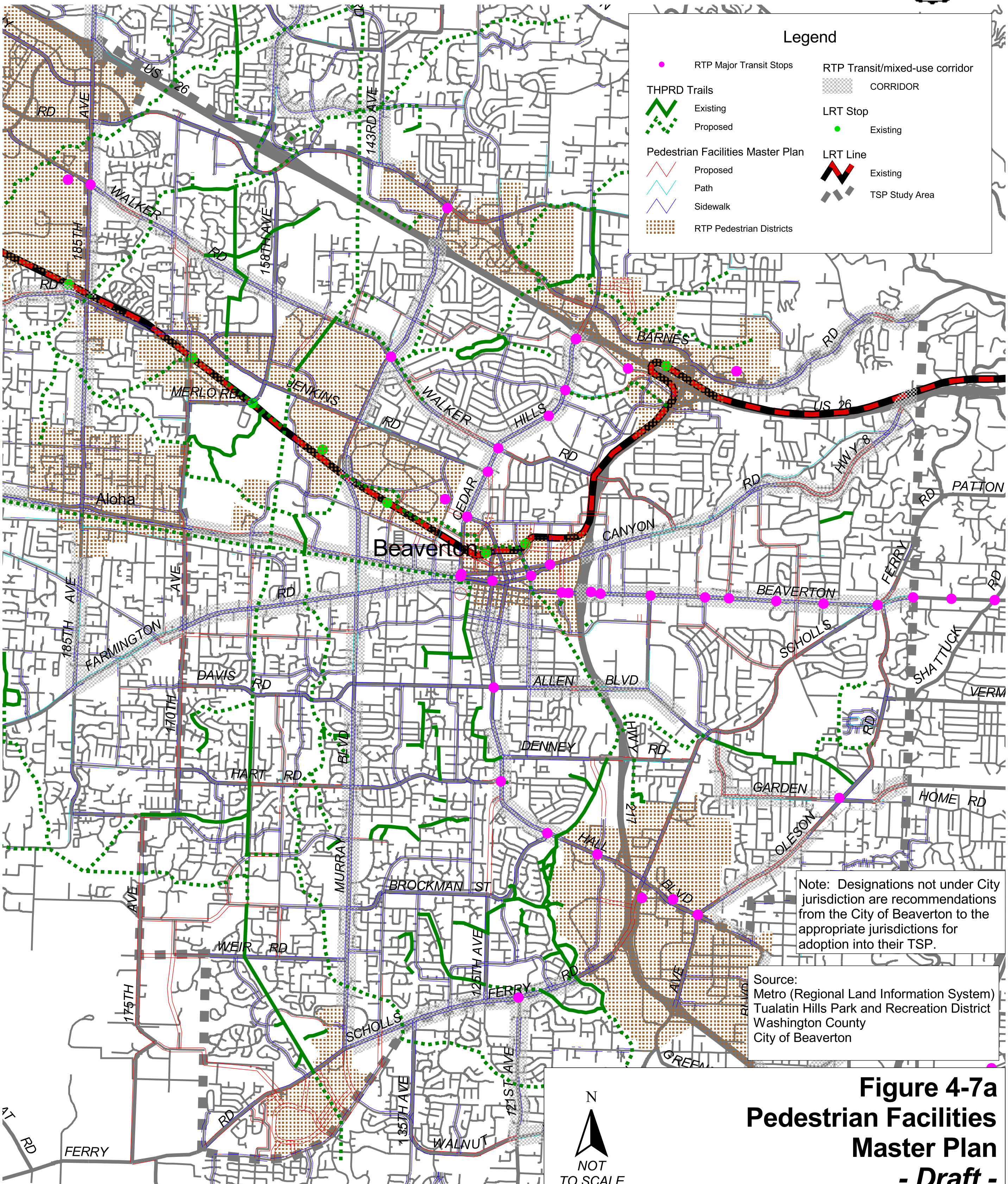

Figure 4-7a
Pedestrian Facilities Master Plan
- Draft -

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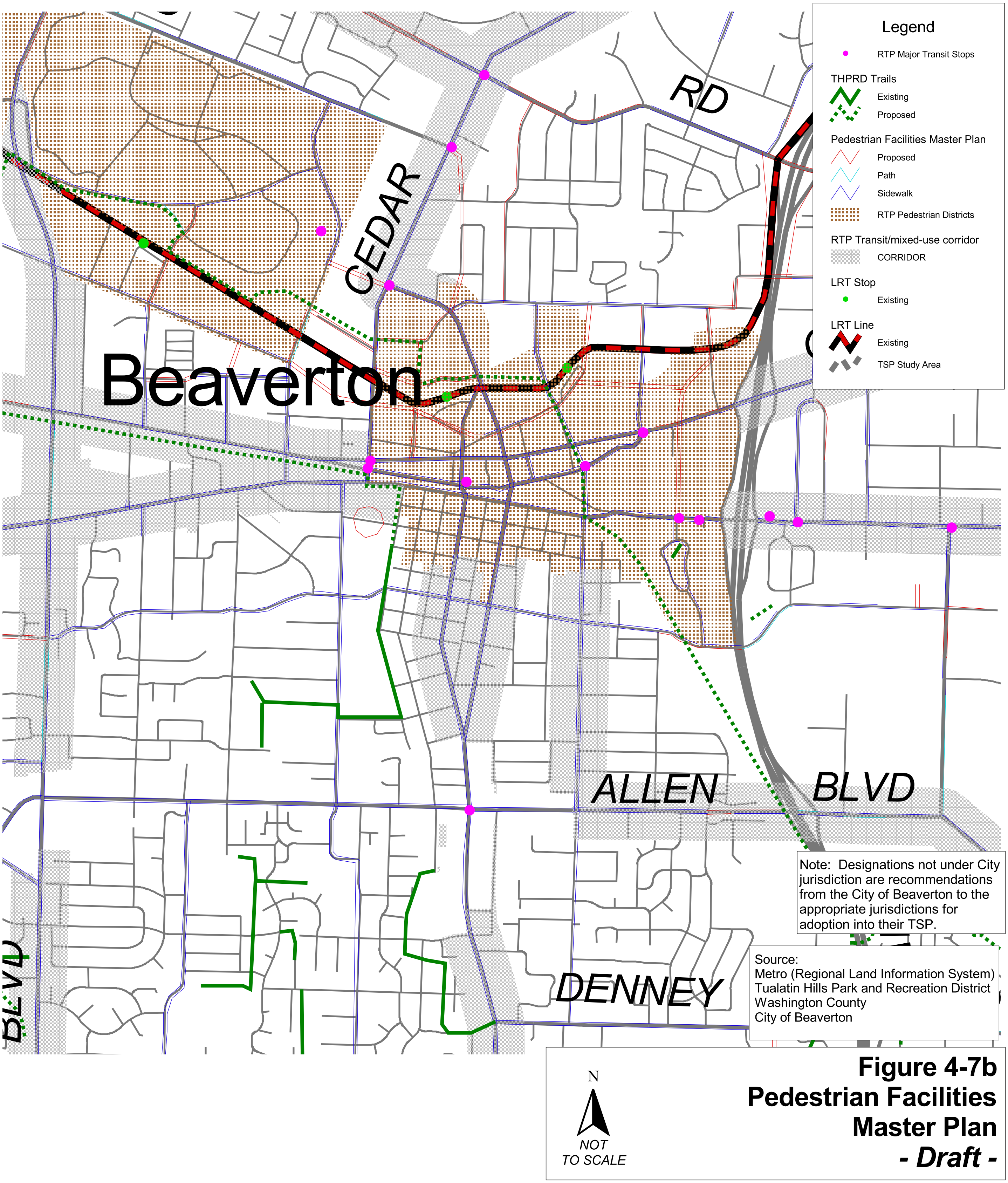


Note: Designations not under City jurisdiction are recommendations from the City of Beaverton to the appropriate jurisdictions for adoption into their TSP.

Source:
Metro (Regional Land Information System)
Tualatin Hills Park and Recreation District
Washington County
City of Beaverton

Figure 4-7b
Pedestrian Facilities Master Plan
- Draft -

Bicycles

The Bicycle Master Plan has been updated from the previous TSP to include completed improvement projects and the expanded TSP Study Area (See Figure 4-8). Bikeway improvements are aimed at closing the gaps in the bicycle network along arterial and collector roadways. The ranking of the bicycle strategies has not changed from the previous TSP and is listed from most important to least important:

- Connect Key bicycle corridors to schools, parks, recreational uses and activity centers (public facilities, commercial areas, etc.)
- Fill in gaps in the network where some segments of bikeway exist
- Bicycle corridors that connect neighborhoods
- Construct bike lanes with roadway improvement projects
- Bicycle corridors that commuters might use
- Bicycle corridors providing mobility to and within commercial areas

The 2000 Metro RTP includes a bicycle functional classification system with the following designations (shown on Figure 4-8):

- Regional Access Bikeway: Function focuses on accessibility to and within the central city, regional centers, and larger town centers. Travel time is an important factor as these bikeways generally have high volumes.
- Regional Corridor Bikeway: Functions as longer routes that provide point-to-point connection between the central city, regional centers, and larger town centers. Generally higher automobile speeds and volumes than community connector bikeways.
- Community Connector Bikeway: Connect smaller town centers, main streets, station areas, industrial areas, and other regional attractions.
- Multi-use paths with bicycle transportation function: Likely to be used for commuting to work or school, accessing transit, or travelling to a store, library, or other local destination. Bicycle/pedestrian sidewalks on bridges are included in this classification. Design includes physical separation from motor vehicle traffic by open space or barrier.

The Bicycle Master Plan builds from state policy from the Transportation Planning Rule and from City of Beaverton policy that all arterial and collector roads have bikeways. The Action Plan is consistent with plans developed by Metro, Washington County, and the State, including providing bikeways consistent with each of the Metro RTP designated bikeways. Additional linkages with lanes or accommodations are outlined to make a complete network. The Bicycle Action Plan (Table 4-11) consists of projects that the City should actively try to fund in the next ten years. With the action plan, a substantial bicycle network would be in place and would allow attention to move toward infill Master Plan projects. The bicycle plan will require incremental implementation. As development occurs, streets are rebuilt and other project funding opportunities (such as grant programs) arise, projects on the Master Plan should be integrated into project development. Many of the projects would be elements of multi-modal street improvement projects (e.g. Murray Boulevard extension). The City, through its Capital Improvement Program, joint funding with other agencies (County, Metro, State) and development approval would implement these projects. Table 4-12 lists bicycle system improvement projects with funds already committed.

Table 4-11: Bicycle Action Plan

Project	From	To	Approximate Cost ($1000's of dollars)
Priority: Connect key bicycle corridors to schools, parks, recreational uses and activity centers			
Greenway Road	Hall Boulevard	125th Avenue	266
155th Avenue/Weir Road	Davis Road	Murray Boulevard	1,190
Millikan Way	Murray Boulevard	TV Highway	521
160th Avenue	TV Highway	Davis Road	503
Canyon Road	142nd Avenue	91st Avenue	1,310
Priority: Fill in gaps in bicycle network			
Hall Boulevard bike lanes	Greenway	ORE 217	357
Hall Boulevard bike lanes	Beaverton-Hillsdale Hwy	Cedar Hills Blvd	78
Hall Boulevard Extension	Cedar Hills	Hocken/Terman	Part of road improv.
Watson Avenue bike lanes	Beaverton-Hillsdale Hwy	Hall Boulevard	68
Cedar Hills Boulevard bike lanes	Farmington Road	Walker Road	506
6th Street bike lanes	Murray Boulevard	Menlo Drive	241
Murray Boulevard bike lanes (west side of Murray Boulevard)	Farmington Road	approximately 200 ft south of TV Highway	48
Denney Road bike lanes	Hall Boulevard	Scholls Ferry Road	684
Allen Boulevard bike lanes	approximately 200 ft east of Western Avenue	Scholls Ferry Road	221
Western Avenue bike lanes	Beaverton-Hillsdale Hwy	Allen Boulevard	337
Beaverton-Hillsdale Hwy bike lanes	ORE 217	91st Avenue	520
Beaverton-Hillsdale Hwy bike lanes	91st Avenue	Wash. County Bound.	1,023

Project	From	To	Approximate Cost ($1000's of dollars)
Scholls Ferry Road	77th Avenue	BH Highway	251
Oleson Road	BH Highway	Terri Court	453
92nd Avenue	Allen Boulevard	Garden Home Road	377
Garden Home Road	92nd Avenue	Oleson Road	641
Scholls Ferry Road	Hall Boulevard	Cascade Avenue	328
Scholls Ferry Road	BH Highway	Wash. County Bound.	431
Taylors Ferry Road	Oleson Road	Washington Drive	137
Davies Road	Scholls Ferry Road	Barrows Road	187
Barrows Road	Scholls Ferry Road (east)	Scholls Ferry Road (west)	1,180
Scholls Ferry Road	Murray Boulevard	175th Avenue	896
Priority: Construct bike lanes with roadway improvement projects*			
125th Avenue bike lanes	Hall Boulevard	Brockman Road	302
Farmington Road Bikeway	Hocken Avenue	Highway 217	3,213
Walker Road bike lanes	ORE 217	Canyon Road	327
Walker Road bike lanes	Cedar Hills Boulevard	Lynnfield Lane	150
Walker Road bike lanes	178th Avenue	185th Avenue	309
Millikan Way bike lanes	Hocken Avenue	Cedar Hills Blvd	91
170th Avenue bike lanes	Alexander Street	Baseline/Jenkins	573
173rd Avenue bike lanes	Walker Road	Cornell Road	371
Hart Road/Bany Road bike lanes	167th Avenue	170th Avenue	69
Cornell Road bike lanes	158th Avenue	185th Avenue	516
Murray Boulevard bike lanes	Scholls Ferry Road	Barrows	172
Allen Boulevard bike lanes	ORE 217	Murray Boulevard	293
Allen Boulevard bike lanes	ORE 217	approximately 200 ft west of Western Ave	108
Nora-Beard Road bike lanes	175th Avenue	155th Avenue	499
Weir Road	175th Avenue	155th Avenue	448
Barnes Road Improvements	Saltzman Road	119th Avenue	Part of road improv
Cornell Road Improvements	143rd Avenue	Saltzman Road	Part of road improv

Project	From	To	Approximate Cost ($1000's of dollars)
Canyon Road	US 26	110th Avenue	6,750
103rd Avenue Connection	Walker Road	Western Avenue	Part of Road improv.
175th Avenue-Rigert Road bike lanes	170th Avenue	ORE 210	1,180
Bicycle Action Plan Projects Total Cost:			**$ 28,125**

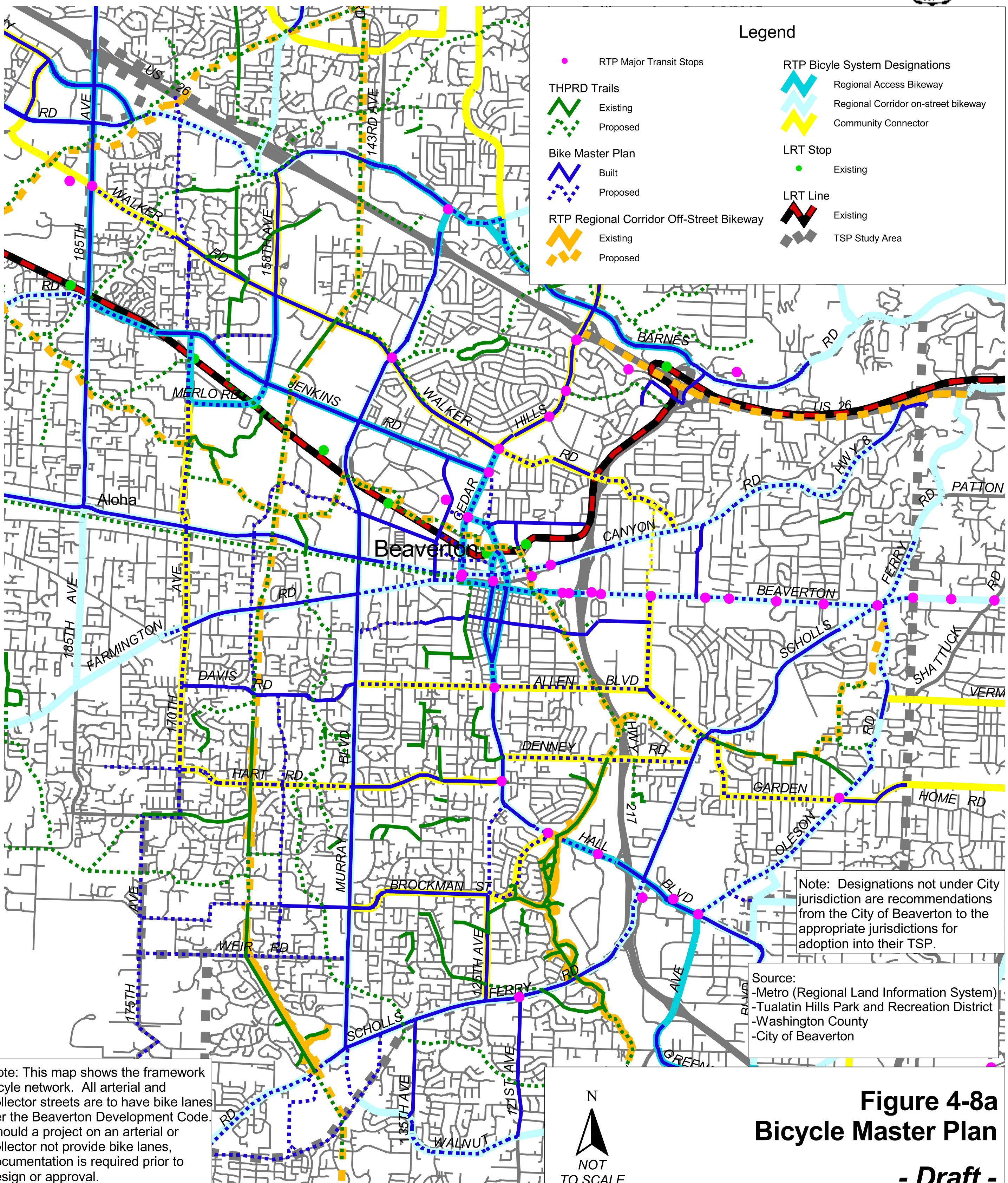
*Bike lanes to be built with roadway improvement projects are dependent on the ROW and alignment of the road improvement and would not be built without the road improvement

Table 4-12: Bicycle Action Plan – Committed Funding Projects

Project	From	To	Approximate Cost ($1000's of dollars)
Priority: Connect key bicycle corridors to schools, parks, recreational uses and activity centers			
Millikan Way bike lanes	Hocken Avenue	Cedar Hills Blvd	91
170th Avenue bike lanes	Rigert Road	Alexander Street	804
170th/173rd Avenue bike lanes	Baseline Road	Walker Road	344
Hall Boulevard bike lanes	12th Street	900 ft south of Allen	154
Hart Road bike lanes	Murray Blvd	167th Avenue	499
Barnes Road Improvements	Saltzman Road	119th Avenue	Part of road improv.
Cornell Road Improvements	Murray Blvd	Saltzman Road	Part of Road improv.
Bicycle Action Plan Projects Total Cost (Committed Funding Projects):			**$ 1,892**

DKS Associates

City of Beaverton Transportation System Plan



Note: Designations not under City jurisdiction are recommendations from the City of Beaverton to the appropriate jurisdictions for adoption into their TSP.

Source:
- Metro (Regional Land Information System)
- Tualatin Hills Park and Recreation District
- Washington County
- City of Beaverton

Note: This map shows the framework bicyle network. All arterial and collector streets are to have bike lanes per the Beaverton Development Code. Should a project on an arterial or collector not provide bike lanes, documentation is required prior to design or approval.

Figure 4-8a
Bicycle Master Plan

- Draft -

City of Beaverton
Transportation System Plan

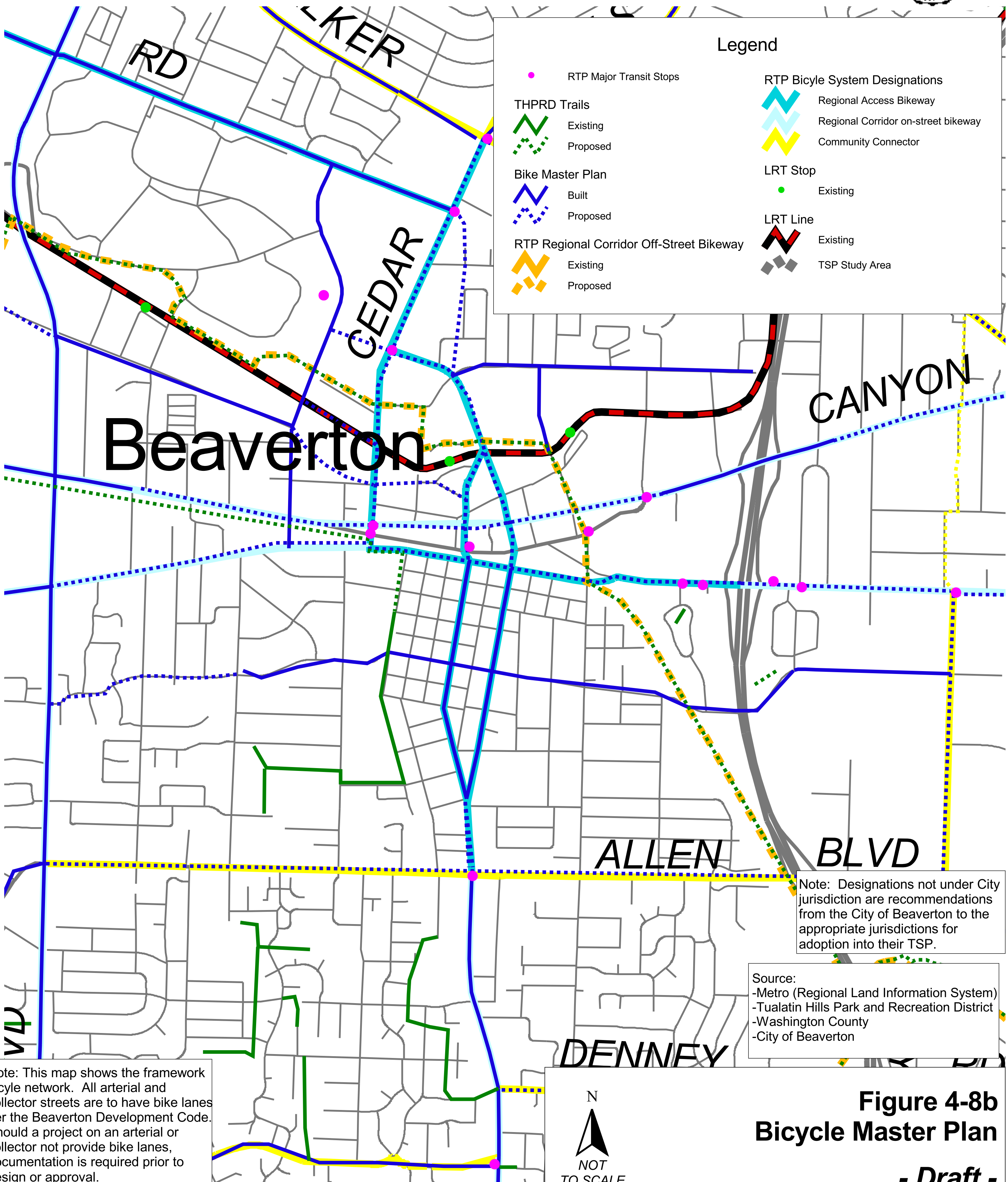


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Figure 4-8b
Bicycle Master Plan

- Draft -

Transit

Currently, there are twenty-three transit routes serving Beaverton (see Figure 4-9). The transit service has been significantly changed from the last TSP due to the opening of the Westside MAX. The existing transit system coverage area includes approximately 85 percent of the modeled transit supportive zones within the Beaverton TSP study area[9]. The future 2020 land use would increase the transit supportive area and reduce the percentage of coverage to approximately 80 percent (see Figure 4-10) without an increase in service coverage. Tri-Met has addressed some of the future transit needs in Beaverton with the planned 10-year improvements listed in Table 4-13. The City of Beaverton should coordinate with Tri-Met to focus possible future transit coverage on those transit supportive areas not covered by the existing system. Transit amenities were also identified in the Tri-Met Ten-Year Service Improvements[10] as a high community priority needing attention in 1-5 years. Transit amenities can make transit ridership increase by making transit an attractive travel alternative. The City of Beaverton should coordinate with Tri-Met and Washington County to provide transit shelters at transit stops designated as major transit stops or with daily boardings above 35 persons. The City of Beaverton should coordinate the provision of sidewalks along major transit streets with Tri-Met. The City of Beaverton should coordinate the provision of transit pass programs and fareless areas with city employers and the Westside Transportation Alliance TMA.

Due to heavily congested arterial corridors, the City will need to coordinate with Tri-Met on the development of corridor level transit services that can help relieve congestion and forestall more expensive capital infrastructure. High quality regional transit service on corridors such as Scholls Ferry Road, Murray Boulevard, Hall Boulevard, TV Highway, Walker Road, and Allen Boulevard can link many high employment, regional center, and town center areas (consistent with the RTP). Metro's RTP includes transit route designations along corridors defined as follows[11]:

- Rapid Bus. Regional rapid bus service emulates LRT service in speed, frequency and comfort, serving major transit routes with limited stops. This service runs as least every 15 minutes during the weekday and weekend mid-day base periods.
- Frequent Bus. Frequent Bus service provides slightly slower, but more frequent, local bus service than rapid bus along selected transit corridors. This service runs at least every 10 minutes and includes transit preferential treatments such as reserved bus lanes and signal preemption.
- Regional Bus. Regional bus service is provided on most major urban streets. This type of bus service operates with maximum frequencies of 15 minutes with

[9] Coverage is determined as the area within 0.25 miles of a bus stop or 0.50 miles of a LRT stop

[10] Transit Choices For Livability Handbook, Tri-Met, 2000.

[11] Based on the *2000 Regional Transportation Plan*, Metro, August 12, 2000.

conventional stop spacing along the route.

The City of Beaverton should coordinate with Tri-Met, ODOT, and Washington County to provide signal priority for transit routes along the RTP designated frequent bus lines (TV Highway/Farmington and Cedar Hills/Hall – approximately 50 signals at approximately $7000 each). Signal priority along the frequent transit routes would improve transit service speed and reliability along these congested corridors with high multi-modal trip potential.

Table 4-13: Tri-Met Ten-Year Service Improvements

Route Description	Frequency** (minutes)	Rough Annual Cost	Projected Implementation
Beaverton-Washington Sq.-Tigard-Tualatin: Rapid bus or commuter rail connections between these communities, including extension to Wilsonville	30	$800,000	3-5 years
Nimbus Businesses: Local service between Nimbus employers and destinations in the Washington Sq. area	30	$385,000	1-3 years
Cornell Oaks Businesses: Shuttle between employers along 158th and in the Cornell Oaks area to MAX, as part of Westside Max start-up	30	$150,000	1-3 years
Existing Tri-Met Lines: Improve frequency and span of service on lines serving Farmington Road, 158th, 185th, 198th, Jenkins, Hart, and Denney		$2,000,000	1-3 years

Source: Transit Choices for Livability Handbook, Tri-Met, 2000.
** Frequency is defined at the time spacing between bus arrivals.

In addition to the Tri-Met 10-year service improvements listed in Table 4-13, the Washington County Commuter Rail project connecting Wilsoville to Beaverton is listed in the RTP as a committed project. The timeline for this project is 2000-2005, with an estimated cost of $71,500,000.

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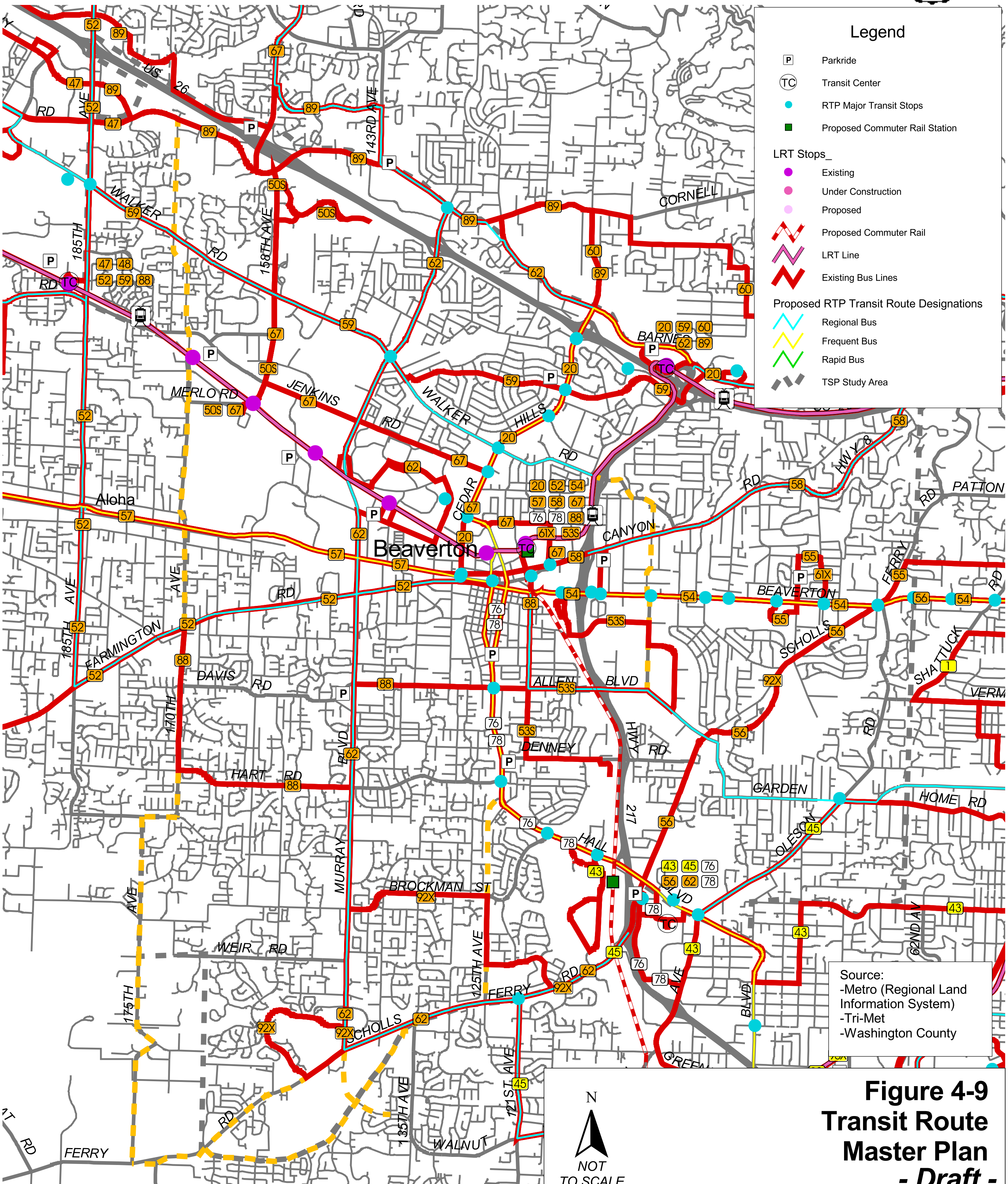

Figure 4-9
Transit Route Master Plan
- Draft -

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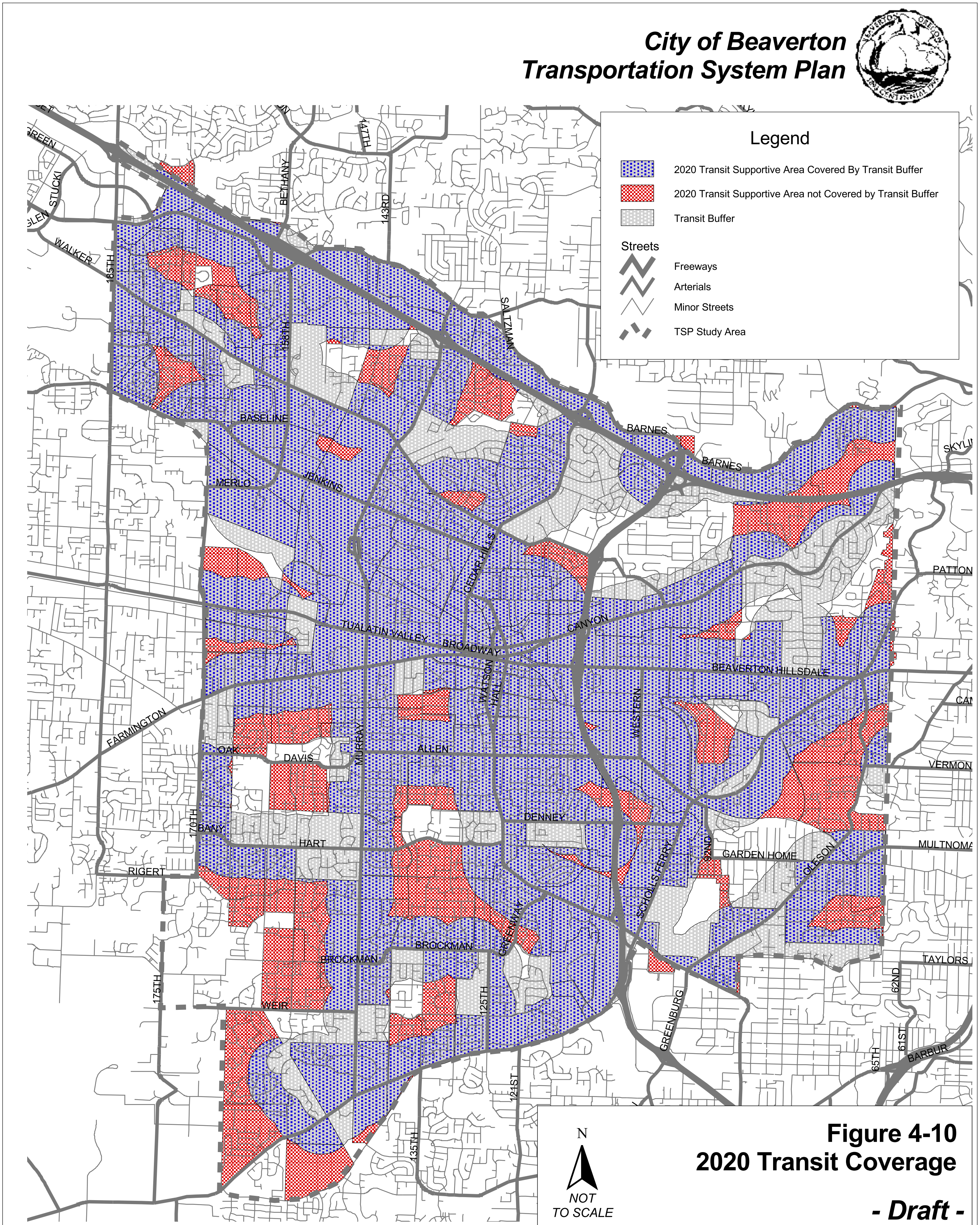

Figure 4-10
2020 Transit Coverage

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Motor Vehicles

Functional Classification

The current functional classification of streets in Beaverton was updated to reflect the expanded TSP study area, on-going regional planning, the functional needs of Beaverton, and consistency with the Regional Transportation Plan. Classifications of principal arterial, arterial, collector, neighborhood route and local have been developed based on connectivity (defined in the 2015 TSP), which is the best indicator of function. Figure 4-11 summarizes the functional classification recommendations. Appendix F summarizes the various jurisdictional functional classifications of major roadways with the TSP study area in a matrix format. This comparison matrix provides a comparison of the adopted City of Beaverton arterial designations to the Washington County and Metro major/minor arterial designations. These comparisons should be used to require that streets designated in the RTP be designed with a modal orientation that reflects the function of the street and the character of surrounding land uses as defined in Chapter 1 of the RTP (see Appendix L)[12].

Based on input from the TAC (Technical Advisory Committee), City Staff, and the Traffic Commission, additional functional class alternatives were considered on Jay Street, Oak Street/Davis Road, and Hart Road/Bany Road west of Murray.

Jay Street (from Jenkins to 158th) was approved for road closure at 158th based on Washington County ordinance on the development of the IBM site. Currently, the road has not been closed as the development action has not proceeded. The Beaverton Traffic Commission recommends that the Jay Street functional classification remain as a collector roadway as it serves as an important congestion relief to the 158th/Jenkins intersection. The Traffic Commission also recommends that if the road were to be closed, the planned improvements on Jenkins, 158th, and Walker should be constructed to insure adequate capacity in the area. Based on the recommendation of the Traffic Commission, the Beaverton Functional Classification Map shall show Jay Street as a collector so that if a new development application is brought to the County or City, the issues of the road closure can be revisited[13].

The functional classification of Oak Street/Davis Road as an arterial and Hart Road/Bany Road as a collector was also discussed by the TAC and the Traffic Commission. The issues discussed were related to how the roadways currently serve traffic in the Beaverton area. Oak/Davis connects to Allen Boulevard to the east and 170th Avenue to the west. Bany/Hart connects to Murray Boulevard at the east and 185th Avenue to the west. The TAC and the Traffic

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[12] Based on the *2000 Regional Transportation Plan*, Metro, August 2000.

[13] Based on Beaverton Traffic Commission Meeting, May 17, 2001.

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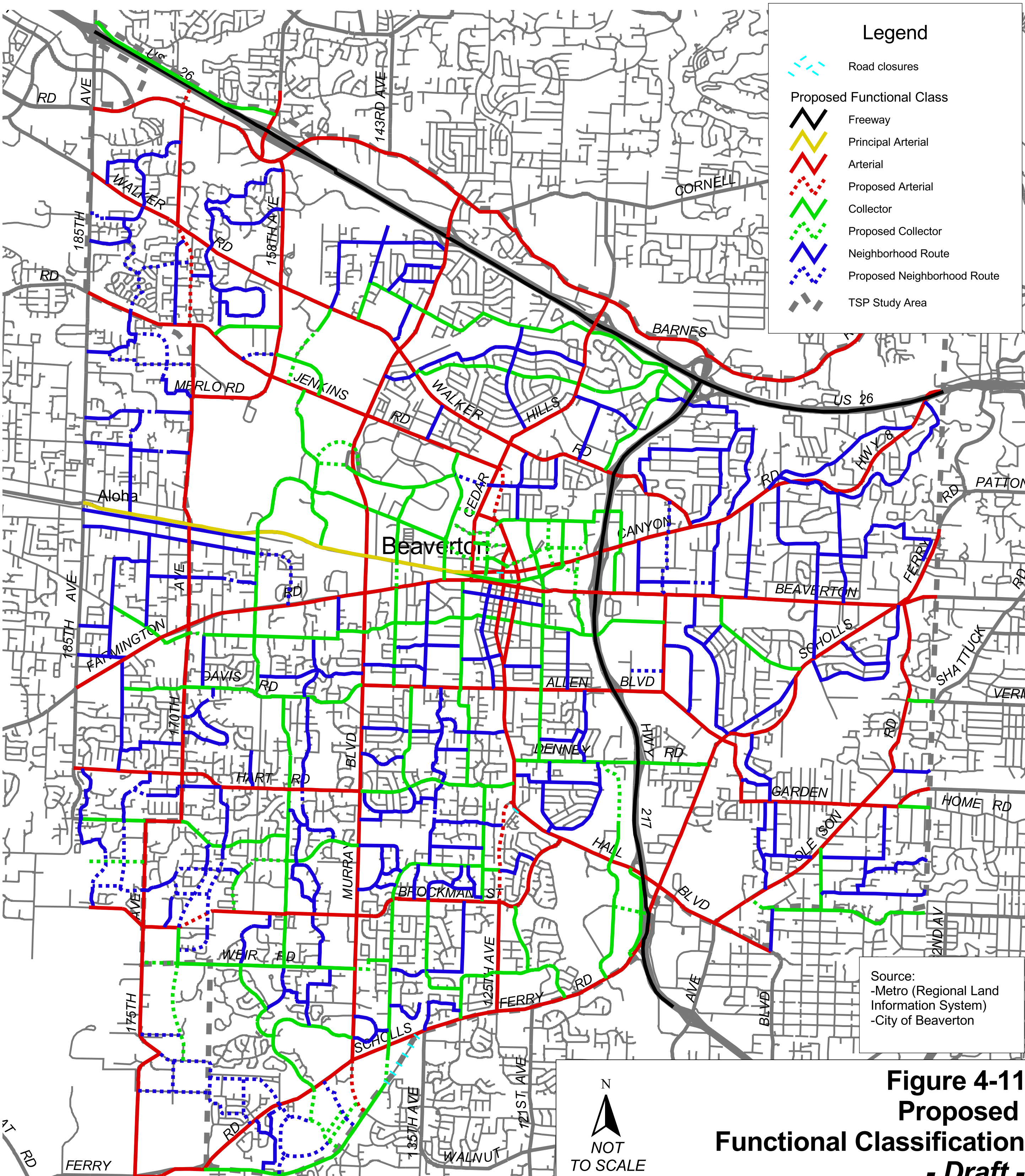

Figure 4-11
Proposed
Functional Classification
- Draft -

Commission both see Hart/Bany connecting to Murray and 185th as the main through route. The access management of the roads was also discussed in relation to an arterial designation having larger access spacing requirements than a collector designation. Oak Street/Davis Road currently has significant residential frontage/access, while Hart Road/Bany Road typically has residential lots backing to the roadway. The Traffic Commission recommended that the functional classification of Oak Street/Davis Road be switched to collector and the classification of Hart Road/Bany Road be switched to arterial based on the function of the road to through traffic and the access characteristics of the roadways[14].

Access Management

Access management is important, particularly on high volume roadways, for maintaining traffic flow and mobility. Where local and neighborhood streets function to provide access, collector and arterial streets serve greater traffic volume. Numerous driveways, or street intersections, increase the number of conflicts and potential collisions and decrease mobility and traffic flow. Beaverton, as with every other city, needs a balance of streets that provide access with streets that serve mobility. The 2015 TSP included the following access management recommendations:

- Incorporate a policy statement regarding prohibition of new single family residential access on arterials and collectors. A design exception process should be outlined that requires mitigation of safety and NTM impacts. This addresses a long standing problem in Beaverton where property owners consume substantial staff time on issues of residential fronting impacts.
- Set standards for access spacing (working with Washington County and ODOT) for arterials (600 foot minimum, 1,000 foot maximum) and collectors (200 foot minimum, 400 foot maximum).
- Specific access management plans be developed for TV Highway and Cedar Hills Boulevard (north of Walker) to maximize the capacity of the existing facilities and protect their functional integrity.

The access management recommendations in the 2015 TSP do not identify specific needs at the freeway interchanges in the study area (along US 26 and ORE 217). Based on the *1999 Oregon Highway Plan* (OHP), access points should not be allowed within 1320 feet of freeway interchanges. Interchanges within the Beaverton 2020 TSP study area exist with numerous access points within 1320 of the interchange. These access points are locations of potential conflict with vehicle queued from the freeway on ramps, especially with queues formed from ramp meters. The following recommendation addresses the need to reclaim vehicular access control near the freeway interchanges to meet ODOT spacing standards:

[14] City of Beaverton Traffic Commission Meeting, May 17, 2001.

- As property redevelops, an evaluation of compliance with relevant access management policies is made for areas proximate to freeway interchange
- If an existing access point is found non-compliant and it is the sole vehicular access for the property, a temporary access permit is issued that allows the property owners to continue access until such a time that alternative means can be made available
- In addition, the applicant will agree to potential cross-easements for circulation between adjoining properties
- When adjoining property re-develops that has compliant alternatives for vehicular access, the temporary permit of the first property owner is terminated and the non-compliant access is closed.

In addition, the proposed functional classification, shown in Figure 4-11, includes a designation of principal arterial for TV Highway west of Cedar Hills. This new designation requires additional code for access spacing and should be coordinated with Washington County and ODOT. The recommended for minimum access spacing on a principal arterial is 1000 feet.

Local Street Connectivity

The 2020 Beaverton TSP Study Area reaches beyond the 2015 TSP Study Area. The 2015 TSP identified potential local street connections for both multi-modal and non-auto connections. The local connectivity map has been updated to include areas not part of the 2015 TSP. Locations of connections within the City have been updated to reflect completed projects and locations where connections where determined unfeasible by City Staff. Connections from Washington County Ordinance 552 were included in the unincorporated areas. Additional multi-modal and non-auto connections were identified both within the City and the unincorporated areas. Detailed connectivity maps, broken into neighborhoods, are shown in Appendix E.

Motor Vehicle Needs

Appendix D provides a detailed analysis of the motor vehicle alternatives analysis. The following summary includes the methodology and resulting improvement projects for the Beaverton 2020 TSP Motor Vehicle Plan. Additional discussion, tables, and figures can be found in Appendix D.

Approach

Existing conditions were identified in Chapter 3. The future 2020 conditions were forecast as noted in Chapter 4. This 2020 forecast includes the Commuter Rail and the highest level of transit service given regional funding constraints[15]. It assumes that Transportation Demand Management (TDM) will occur and that significant shifts to transit will occur. While numerous

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[15] This system assumes the commuter rail and all the feeder bus system that supports it. Other westside bus service is provided also.

analysis scenarios were developed, the base 2020 conditions assumed a street network that included the RTP Priority System improvements and the improvements identified in the 2015 Beaverton TSP. This was done because the prior TSP and RTP both confirmed that this level of motor vehicle transportation investment would be necessary to minimally address the future 2020 needs of the Beaverton area. RTP Priority System motor vehicle projects within the Beaverton TSP Study area are listed in Table 4-14. Beaverton 2015 TSP improvements are listed in Tables 4-15 and 4-16. Table 4-17 lists the 2015 TSP projects that have been constructed or have received committed funding for design/construction since the 2015 TSP was adopted. Performance was evaluated using a three-tiered assessment of capacity and operations.

- Demand to capacity (D/C) ratios[16] were evaluated on roadway segments and conditions where the demand to capacity ratio exceeded 1.0 were studied for potential improvements (based on a 1-hour and 2-hour D/C ratio). Areas within a 2040 design type of Regional Center, Town Center, Main Street, or Station Communities were studied if the 1-hour D/C ratio exceeded 1.1 or the second hour exceeded 1.0.
- Intersection level data were developed for about 95 intersections in Beaverton (based upon staff input, for primarily arterial and collector intersections). While this is a broad sampling of intersections, it does not represent every intersection in the City. Therefore, there may be other locations that may require some mitigation. Alternative improvements were considered where D/C ratios exceeded 1.0 or Level of Service (LOS) was at F or worse. Mitigated levels of service were generally brought to the D/C ratio 1.0 or LOS of E/F range for the 20-year planning assessment.
- New roadway alignments were considered if connectivity was needed to reduce traffic volumes on congested roadways. The goal of new road alignments was to achieve a roadway that would carry a daily volume of at least 5,000 to 10,000 vehicles per day or would significantly reduce the volume on other congested roadway facilities. Additionally, new road connections/alignments were considered if they would reduce neighborhood traffic volumes by 2,000 to 4,000 vehicles per day.

[16] Demand to capacity ratio is similar to volume to capacity (V/C) ratio. The difference is that in the future demand is being estimated and therefore the term demand is utilized. For existing conditions, volume refers to the actual traffic on the roadway. While a demand to capacity ratio can exceed 1.0, a volume to capacity ratio would never exceed 1.0.

Table 4-14
Beaverton Motor Vehicle System Improvements included in the RTP Priority System*

RTP #	Location	Improvement	Jurisdiction	Time-Line	Cost
1184	BH Highway/Scholls Ferry Road	Redesign the intersection to improve safety for all modes of travel.	ODOT/WACO	2006-2010	$13,000,000
6013	Hall: Scholls Ferry to Locust	Widen to 5 lanes. Includes sidewalk and bike lanes	ODOT	2006-2010	$4,700,000
6017	Taylors Ferry: Washington to Oleson	Construct a 3 lanes extension with sidewalks and bike lanes	WACO	2011-2020	$1,900,000
6025	Scholls Ferry: 217 to 125th	Implement system management strategies	WACO	2000-2005	$500,000
6052	Highway 217 Overcrossing: Nimbus to Mall Area	Construct a 2 lane crossing including sidewalks and bike lanes	Tigard	2011-2020	$25,000,000
6119	Murray/Scholls Town Center	Construct 2 lane Teal Road collector extension to Town Center Loop and Barrows, transit collectors from Murray to Town Center Loop, and new neighborhood route connections	WACO/Beaverton	2011-2020	$11,000,000
6121	Murray: Scholls Ferry to Barrows	Construct a 4 lane extension to Walnut at Barrows including sidewalks and bike lanes	Beaverton/Tigard/WACO	2000-2005	$7,120,000
6122	Davies Road: Scholls Ferry to Barrows	Construct a 3 lane extension to Barrows including sidewalks and bike lanes	Beaverton	2006-2010	$1,500,000
3000	ORE 217	Add capacity based on recommendations from the ORE 217 corridor study	ODOT	2011-2020	$70,000,000
3001	ORE 217: TV Hwy to US 26	Widen the northbound to 3 lanes with ramp improvements	ODOT	2006-2010	$21,000,000
3002	ORE 217 and US 26	Reconfigure the interchange with braided ramps	ODOT	2006-2010	$50,000,000
3006	US 26: Camelot Court to Sylvan	Add 3rd through lane and collector distributor system	ODOT	2000-2005	$22,000,000
3007	US 26: ORE 217 to Camelot Court	Widen eastbound to 3 lanes	ODOT	2006-2010	$12,000,000
3009	US 26: Murray to 185th	Widen freeway to 6 lanes with possible HOV lane	ODOT	2011-2020	$26,000,000
3019	Beaverton Connectivity	Complete several downtown street connections	Beaverton	2000-2005	$13,200,000
3020	Beaverton Connectivity	Complete several downtown street connections	Beaverton	2006-2010	$13,300,000
3022	Jenkins: Murray to 158th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006-2010	$1,870,000
3023	ORE 217: Allen to Walker	Interchange improvements	ODOT/WACO/Beaverton	2000-2005	$3,600,000
3025	TV Hwy: Cedar Hills to 10th	Add capacity based on recommendation from refinement planning	ODOT/WACO	2011-2020	$33,200,000
3031	Allen: ORE 217 to Murray	Widen to 5 lanes including sidewalks and bike lanes	Beaverton	2011-2020	$8,500,000
3032	Cedar Hills: Farmington to Walker	Widen to 5 lanes including sidewalks and bike lanes	Beaverton	2006-2010	$3,700,000
3033	125th: Brockman to Hall	Construct a 2 lane extension with turn lanes including sidewalks and bike lanes	Beaverton	2000-2005	$9,800,000
3034	Hall: Cedar Hills to Hocken	Construct a 3 lane extension with sidewalks and bike lanes	Beaverton	2000-2005	$4,600,000
3036	158th/Merlo: 170th to Walker	Widen to 5 lanes including sidewalks and bike lanes	WACO	2011-2020	$4,000,000
3038	Center: Hall to 113th	Widen to 3 lanes including sidewalks and bike lanes	Beaverton	2011-2020	$3,200,000
3060	TV Hwy: 117th to Hillsboro	Implement access management strategies	ODOT/WAC	2006-	$15,000,000

RTP #	Location	Improvement	Jurisdiction	Time-Line	Cost
			O	2010	
3061	TV Hwy: 209th to ORE 217	Interconnect Traffic Signals	ODOT/WACO	2006-2010	$1,500,000
3063	Murray: TV Hwy to Allen	Interconnect Traffic Signals	WACO	2000-2005	$50,000
3069	Scholls Ferry: Hamilton to Garden Home	Widen to 3 lanes including sidewalks and bike lanes	WACO	2011-2020	$8,000,000
3076	Allen: ORE 217 to Western	Widen to 5 lanes including sidewalks and bike lanes	Beaverton	2011-2020	$1,000,000
3084	170th: Alexander to Merlo	Widen to 5 lanes including sidewalks and bike lanes	WACO	2011-2020	$8,000,000
3085	170th: Rigert to Blanton to Alexander	Widen to 3 lanes from Rigert to Blanton and 5 lanes from Blanton to Alexander including sidewalks and bike lanes	WACO	2000-2005	$26,700,000
3086	158th: Walker to Jenkins	Widen to 5 lanes including bike lanes	WACO	2011-2020	$450,000
3087	Millikan: TV Hwy to 141st	Widen to 5 lanes including sidewalks and bike lanes	Beaverton	2011-2020	$4,000,000
3088	Millikan: 141st to Hocken	Widen to 3 lanes including sidewalks and bike lanes	WACO	2011-2020	$3,400,000
3121	TV Hwy: Cedar Hills to Minter Bridge	Refinement Planning to identify phased strategy to implement a limited-access facility	ODOT	2000-2005	N/A
3141	170th/173rd: Baseline to Walker	Widen the street to 3 lanes including sidewalks and bike lanes	WACO	2006-2010	$5,500,000
3143	Walker: Cedar Hills to 158th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006-2010	$20,000,000
3144	Walker: 158th to Amberglen	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006-2010	$10,000,000
3148	Walker: Cedar Hills to ORE 217	Widen to 3 lanes including sidewalks and bike lanes	WACO	2006-2010	$8,000,000
3175	Barnes: ORE 217 to 119th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006-2010	$6,200,000
3177	Cedar Hills/Barnes	Reconstruct intersection and approaches to add travel lanes, turn lanes, and traffic signal upgrades	WACO	2000-2005	$1,800,000
3181	Cornell: US 26 to 143rd	Widen to 5 lanes including sidewalks and bike lanes	WACO	2011-2020	$3,000,000
3183	Cornell: 143rd to Saltzman	Widen to 3 lanes including sidewalks and bike lanes	WACO	2000-2005	$4,600,000
3185	Barnes: Saltzman to 119th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2000-2005	$5,300,000
3186	Murray: Science Park to Cornell	Widen to 5 lanes including sidewalks and bike lanes	WACO	2000-2005	$3,100,000
3191	Cornell	Modify intersections at Saltzman, Barnes, Murray, and Trail	WACO	2011-2020	$500,000
3204	Cornell: Bethany to 179th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2006-2010	$4,000,000
3205	173rd/174th	Construct a new 2 lane undercrossing of US 26 from Cornell to Bronson including sidewalks and bike lanes	WACO	2011-2020	$14,800,000
3214	Farmington: 172nd to 185th	Widen to 5 lanes including sidewalks and bike lanes	WACO	2011-2020	$10,000,000
			TOTAL		**$529,590,000**

*This project list is based on the August 10th, 2000, *2000 Regional Transportation Plan*, and includes projects in the Financially Constrained and Priority Motor Vehicle System

Table 4-15
Beaverton 2015 TSP Motor Vehicle Improvements not identified in the RTP Priority Scenario

Location	Description	Jurisdiction	Cost
Hocken at TV and Farmington	Widen Hocken to accommodate 2 additional lanes between TV and Farmington to allow turn lanes, Widen TV from 141st to Hocken to allow 3 through lanes and additional turn lanes	ODOT/Beaverton	$6,100,000
ORE 217: Walker/Cabot/Canyon Ramps	Braid ramps between Canyon and Walker/Cabot split diamond	ODOT	$20,800,000
Bany/Hart: 170th to 160th	Improve to 2-3 lanes including sidewalks and bike lanes	WACO	$1,000,000
170th: Merlo to Baseline	Widen to 3 lanes including sidewalks and bike lanes	WACO	$2,100,000
170th: Division to Blanton	Widen to 5 lanes including sidewalks and bike lanes	WACO	$2,500,000
Hyland Extension: Carr to Hart	Extend Roadway	Beaverton	$115,000
ORE 217: Denney/Allen	Collector/Distributor connection	ODOT	$8,600,000
Cedar Hills: Walker to US 26	Complete 5 lane roadway with access control including sidewalks and bike lanes	WACO	$2,100,000
143rd/Meadow: Science Park - Walker	Construct a new 2 lane road connections including a grade separation of US 26 including sidewalks and bike lanes	WACO	$16,000,000
Walker Road: Murray to ORE 217	Widen to 5 lanes including sidewalks and bike lanes	WACO	$26,500,000
Jenkins: Murray to Cedar Hills	Widen to 5 lanes including sidewalks and bike lanes	WACO	$3,800,000
Scholls Ferry: Hall to 125th	Widen to 7 lanes including sidewalks and bike lanes	WACO/ODOT	$15,760,000
Scholls Ferry: Teal to 175th	Widen to 5 lanes including sidewalks and bike lanes	WACO	$4,000,000
Beard/Nora: Murray to 170th	Improve to 2-3 lanes including sidewalks and bike lanes	WACO	$6,600,000
Weir: Murray to 175th	Improve to 3 lanes including sidewalks and bike lanes	Beaverton	$3,700,000
Hall north of Center	Extend new 5 lane roadway north of Center to connect with Jenkins at Cedar Hills including sidewalks and bike lanes	Beaverton	$11,000,000
Center: Cedar Hills to Hocken via Westgate	Extend public roadway with 3 lanes including sidewalks and bike lanes from Center to Westgate and from Westgate to Hocken	Beaverton	$1,500,000
141st: Tek to Farmington	Realign and extend 2/3 lane roadway including sidewalks and bike lanes	Beaverton	$2,800,000
Nimbus: Hall to Denney	Extend 2/3 lane roadway including sidewalks and bike lanes	Beaverton	$8,300,000
Local Streets	Add local and collector connectivity	Beaverton	$41,900,000
Traffic Signals	Addition of 50 traffic signals per plan	Beaverton/ WACO/ODOT	$12,500,000
Intersection Improvements	Listed in Table 4-16	Beaverton/ WACO/ODOT	$60,325,000
		TOTAL	**$258,000,000**

Table 4-16
2015 TSP Intersection Improvements

#	Location	Improvement	Cost
1	Kinnaman/Farmington	Widen Farmington to 5 lanes; add WB left turn lane; add NB/SB left turn lane; signal phasing modifications to NB/SB permitted/protected phasing	$1,250,000
2	Walker/173rd	Widen Walker Road to 5 lanes; add EB/WB right turn lanes; NB/SB double left turn lanes	$2,000,000
3	Baseline/170th	SB double left turn lanes; signal phasing modification of NB/SB to protected phasing; add WB right turn lane	$1,250,000
4	Merlo/170th	Signal phase change to permitted/protected for NB/SB approaches and to protected phasing for EB/WB approaches; add NB right turn lane; add NB, SB, and EB left turn lanes	$1,500,000
5	TV Highway/170th	Widen TV Highway to 7 lanes (3 through lanes each way); widen 170th to 5 lanes; add SB right turn lane; WB double left turn lanes	$1,000,000
6	Farmington/170th	Widen Farmington to 5 lanes; add NB left turn lane; add NB through lane and restripe SB for additional through lane (widen 170th to 5 lanes)	Cost included in roadway project
7	Hart-Bany/170th	Install traffic signal; add NB and SB left turn lanes	$1,250,000
8	Walker/167th	Install traffic signal; add NB and SB left turn lanes	$250,000
9	Cornell/158th	Add EB right turn lane	$500,000
10	Walker/158th	NB/SB double left turn lanes; add EB right turn lane; NB right turn lane; WB through lane (2 through lanes in each direction); signal phasing change to EB/WB permitted/protected phasing	$2,250,000
11	Jenkins/158th	Add NB right turn lane; add SB through lane and restripe SB approach; WB double left turn lanes; WB through lane (5 lanes on Jenkins)	$1,000,000
12	TV Highway/Millikan	Widen TV to 7 lanes; add SB and NB lane across intersection	$1,625,000
13	Hart/155th	Add WB left turn lane	$500,000
14	Jenkins/153rd	Widen Jenkins to 5 lanes (2 through lanes each way)	Cost included in roadway project
15	TV Highway/153rd	Widen TV Highway to 7 lanes (3 through lanes each way)	Cost included in roadway project
16	Farmington/149th	Widen Farmington to 5 lanes	Cost included in roadway project
17	Walker/Murray	Add double left turn lanes on all approaches; add right turn lanes on all approaches	$4,000,000
18	Murray/Jenkins	Add NB and SB right turn lanes; NB and SB double left turn lanes; widen Jenkins to 5 lanes	$2,000,000
19	TV Highway/Murray	Double left turn lanes on all approaches; add NB/SB through lane (3 through lanes each way) DCP; install median at TV/Railroad tracks/Farmington to restrict driveways to right in, right out	$1,500,000
20	Murray/Farmington	Double left turn lanes on all approaches; SB, EB, and WB right turn lanes	$2,500,000
21	Murray/6th	Install traffic signal; add EB and WB left turn lanes	$250,000
22	Murray/Allen	Widen Allen to 5 lanes to Murray (drop additional WB through lane after Murray); add SB right turn lane	$600,000
23	Murray/Hart	Signal phase change to permitted/protected phasing for all approaches	$125,000
24	Murray/Scholls Ferry	Restripe NB, SB, and EB approaches; signal phase change to protected phasing on all approaches	$125,000
25	Murray/Barrows/ Walnut	Install traffic signal; add EB left turn lane; restripe NB approach; construct SB approach left turn lane	$750,000
26	Scholls Ferry/Barrows (west)	Install traffic signal; restripe SB approach for separate left turn and right turn lanes	$250,000
27	Scholls Ferry/Davies	Install traffic signal; restripe WB approach; add NB right turn lane; add NB left turn lane	$250,000
28	Scholls Ferry/Barrows (east)	Close Barrows at Scholls Ferry	$150,000
29	TV Highway/Hocken	Add EB right turn lane; restripe SB approach; widen Hocken to 2 SB through lanes	$3,100,000
30	Farmington/Hocken	Add WB right turn lanes; SB double left turn lanes (Hocken carries 2 SB lanes from TV Highway)	$3,000,000

#	Location	Improvement	Cost
31	Cedar Hills/Walker	Double left turn lanes on all approaches; add EB right turn lane	$2,500,000
32	Cedar Hills/Jenkins	SB and EB double left turn lanes; add SB right turn lane; widen Jenkins to 5 lanes; WB right turn channel; signal modifications to EB/WB protected phasing	$1,750,000
33	Cedar Hills/Hall	Add NB right turn lane	$500,000
34	Cedar Hills/Westgate	Add NB left turn lane	$1,300,000
35	Canyon/Cedar Hills	Widen Canyon to 7 lanes on west leg; add NB left turn lane; add SB left turn lane; add SB right turn lane; add EB/WB left turn lane	$5,000,000
36	Farmington/Cedar Hills	SB double left turn lanes (construct SB right turn lane and restripe SB lanes as side-by-side left turn lanes)	$1,000,000
37	Hall/Westgate-Center	Realign intersection; signal modification to EB/WB protected/permitted phasing	$250,000
38	Canyon/Watson	Restripe SB approach (add a SB receiving lane)	$700,000
39	Farmington/Watson	Add SB through lane	$500,000
40	Farmington/Hall	Restripe NB approach (add NB receiving lane)	$500,000
41	Hall/Allen	Add EB and WB right turn lanes; NB and SB double left turn lanes	$1,700,000
42	Hall/Denney	NB/SB signal phasing change to permitted/protected	$150,000
43	Hall/Greenway	Signal phase change to permitted/protected phasing for EB and WB approaches, overalap NB right turn	$125,000
44	Hall/Nimbus	Signal phase change to protected/permitted phasing for NB and SB approaches	$125,000
45	Scholls Ferry/Hall	Add double left turn lanes on all approaches; add right turn lane on all approaches	$3,000,000
46	Brockman/125th	Signal phase change to protected/permitted phasing for all approaches; add WB left turn lane; restripe NB and EB approaches; construct SB left turn lane, right turn lane, and through lane	Cost included in roadway project
47	Scholls Ferry/125th	Widen Scholls Ferry Road to 7 lanes (3 through lanes each way); add SB right turn lane	$500,000
48	Scholls Ferry/Nimbus	Widen Scholls Ferry to 7 lanes (3 through lanes in each direction); add NB left turn lane; SB double left turn lanes	$1,000,000
49	Scholls Ferry/ORE 217 SB ramps	Channel EB right turn onto ramp and modify signal to allow free movement of EB right turns	$500,000
50	Scholls Ferry/Ore 217 NB on-ramp	Channel SB right turn onto ramp and modify signal to allow free movement of SB right turns; add WB through lane onto ramp	$500,000
51	Farmington/Lombard	Add NB right turn lane	$500,000
52	Canyon/Broadway	Add WB right turn lane; signal modification to NB/SB protected phasing	$200,000
53	Canyon/Fred Meyer	Add SB left turn lane; signal modification to NB/SB split phasing	$125,000
54	BH Highway/Griffith	Signal phasing modification to NB/SB protected/permitted phasing	$150,000
55	BH Highway/Western	Add EB right turn lane; add WB double left turn lanes; add NB through lane	$1,500,000
56	Allen/Western	Add EB left turn lane; EB/WB signal phasing change to permitted/protected phasing	$125,000
57	Allen/Scholls Ferry	Widen Allen to 5 lanes; restripe WB approach; signal phase change for all approaches to permitted/protected phasing	$125,000
58	Walker/ORE 217 SB	Bridge deck widening; EB double right turn lanes (add right turn lane); WB through lane	$750,000
59	Walker/ORE 217 NB	Add NB double left turn lanes	$250,000
60	Canyon/ORE 217 SB	Add SB left turn lane and restripe SB lanes	$500,000
61	BH Highway/ORE 217 SB	Add SB left turn lane	$500,000
62	BH Highway/ORE 217 NB	NB double left turn lanes	$600,000
63	Allen/ORE 217 SB	Add SB right turn lane (double right lanes); EB right turn lane (channel onto ramp; signal modification to allow EB right turn to go with SB left)	$2,000,000
64	Allen/ORE 217 NB	Add WB right turn lane; signal modifications to NB/SB split phasing	$500,000
65	Denney/ORE 217 SB	Install traffic signal	$250,000
66	Denney/ORE 217 NB	Install traffic signal	$250,000
67	Denney/Lombard	Install traffic signal and EB and WB left turn lanes	$1,125,000
			$64,025,000

Table 4-17
Committed/Completed Beaverton 2015 TSP Motor Vehicle Improvements

Location	Description	Jurisdiction	Cost
Farmington: Murray to 172nd	Widen to 5 lanes including sidewalks and bike lanes	WACO	$15,200,000
Oak: 160th to 170th	Widen roadway including sidewalks and bike lanes	WACO	$1,600,000
US 26: ORE 217 to Murray	Widen to 6 lanes and add braided ramps	ODOT	$13,000,000
Jenkins: Cedar Hills to Murray	Widen to 3 lanes including sidewalks and bike lanes	WACO	$3,100,000
170th: Rigert to Alexander	Widen to 5 lanes including sidewalks and bike lanes	WACO	$8,000,000
Millikan: Hocken to Cedar Hills	Construct new 3 lane extension with sidewalks and bike lanes	Beaverton	$4,300,000
Hart: Murray to 165th	Widen to 3 lanes including sidewalks and bike lanes	Beaverton	$7,100,000
Lombard: Broadway to Farmington	Realign and add turn lanes including sidewalks	Beaverton	$1,600,000
Hall Boulevard at Scholls Ferry	Provide southbound right turn lane	ODOT	$250,000
Hall: 12th St to 500 feet south of Allen	Retrofit to include bike lanes; intersection turn lanes at Allen	Beaverton	$1,438,000
Farmington: Murray to Hocken	Widen to 5 lanes including turn lanes, sidewalks, and bike lanes	Beaverton	$9,300,000
		TOTAL	**$64,888,000**

Assessment of Need

Based upon the evaluation of intersection level of service, 32 of the study intersections would operate at or worse than a D/C ratio 1.0 or a Level of Service (LOS) of E in the 2020 evening peak hour with no improvements beyond the RTP Priority System or 2015 Beaverton TSP improvements. Intersection operation for the existing and base 2020 scenarios are shown in Appendix D. The impact of future growth would be severe without significant investment in transportation improvements. Corridors would become unmanageably congested, resulting in travel speeds below 5 MPH over long stretches of road. Poor performance on arterials and collectors would result in substantial impacts (added through traffic) to other collectors and neighborhood routes. The greatest problem areas can be grouped into the following areas:

- **Lack of east-west capacity.** Three of the key east-west routes (TV Highway, Walker, Cornell and Farmington) all experience significant congestion problems if improvements are not made.
- **Lack of connectivity.** Areas near ORE 217 between Walker and Hall are the best examples, where all north-south movements must use local streets or divert to neighboring arterials.
- **Lack of intersection turning capacity.** Many intersections experience congested conditions, not the need for through capacity, but the need for additional right or left turning capacity.

Recommended Improvement Plan

To address these deficiencies, a series of alternatives and strategies were considered. The range of strategies includes:

- **Do nothing.** This would result in severe impacts to circulation in Beaverton with delays that would not be tolerable. Extreme land use controls would be required to protect livability.
- **Assume that alternative modes can serve excess demand.** The TSP analysis

assumed that these would be developed to their optimal levels to achieve mode-split targets. The order of magnitude of trips to be served by 2020 goes well beyond the capacity of the alternative mode system by themselves, even at their optimal levels. The estimated growth in PM peak period trips far exceeds the capacity of the alternative modes by themselves to support this demand.

- **Build all the road capacity necessary to achieve level of service D conditions at the intersections**. This strategy would result in nearly doubling the cost of the improvements identified in this plan. For example, many five lane cross sections would need to become seven lanes, substantial freeway widening beyond those currently foreseen and very large intersection configurations.
- **Pragmatically add capacity to all modes, developing a balanced system. Outline the long-term configuration of streets to allow development to best accommodate needs. Allow LOS E or D/C ratios of 1.0 at intersections and maintain system performance measures at a 2-hour D/C ratio of 1.0.** This is the strategy that was pursued. It involves significant system improvements, but attempts to balance performance between modes by not only adding additional capacity, but by also providing additional connectivity to serve and promote multi-modal trips.

The mitigation measures for the street system are listed in Table 4-18. These are improvements that go beyond the RTP Priority System or the 2015 Beaverton TSP identified improvements. The major road improvements (Bethany, Cornell, Walker, and Murray/TV Highway) are mainly refinements of the RTP recommendations and include some of the RTP Preferred Scenairo improvement projects. The detailed intersection improvements go beyond the level of analysis presented in the RTP and are recommended in this TSP based on the detailed intersection counts, forecasts, and LOS calculations.

Table 4-18
Beaverton 2020 TSP Preferred Additional Motor Vehicle Improvement Plan

Note: Location #'s listed as "_b" indicate that the improvement is in addition to an intersection improvement at that location from the 2015 TSP, intersections that were not included in the 2015 TSP improvement plan are numbered starting with 101

Location #	Location	Description	Cost
	Bethany Boulevard: Cornell to Bronson	Widen street to 5 lanes including sidewalks and bike lanes (this includes the widening of the US 26 overcrossing and intersection improvements).	$3,424,000
	Cornell: 143rd to Dale	Widen street to 5 lanes including sidewalks and bike lanes.	$5,197,500
	Cornell: Dale to Saltzman	Future capacity improvement based on additional study and coordination with Washington County	$8,620,000
	Walker: Cedar Hills to ORE 217	Widen street to 5 lanes including sidewalks and bike lane.	$8,970,000
	Murray: TV Hwy to Farmington	Construct an 4 lane overpass (Murray over TV Highway and Farmington), including sidewalks, bike lanes, and interchange connections	$28,517,500
	103rd: Western to Walker	Improve existing roadway and construct new connections and intersection alignments to provide connectivity from Walker to Western. This project includes sidewalks and bike lanes and should be built as development occurs.	$5,500,000
	120th Avenue: Henry to Canyon Road	Construct a 2 lane collector road, including sidewalks and bike lanes	$3,900,000

Location #	Location	Description	Cost
	Fairfield: Cedar Hills to Hocken	Construct a 2 lane roadway, including sidewalks and bike lanes	$5,500,000
	Rose Biggi: Canyon to Broadway	Construct a 2 lane collector road, including sidewalks and bike lanes	$1,200,000
101	Bethany/US 26 WB	add 2nd WB RT Lane, NB LT Lane	N/A
102	Bethany/Cornell	overlap SB RT	N/A
103	Cornell/173rd	add WB RT lane, 2nd NB LT lane, NB RT lane, SB RT lane	$2,200,000
6b	170th/Farmington	add EB RT lane, WB RT lane (signal modification)	$750,000
11b	158th/Jenkins	overlap NB RT	$125,000
104	Cornell/US 26 WB	add 2nd WB LT lane (structure work)	$1,000,000
105	Murray/Cornell	overlap NB RT, add 2nd NB LT lane (Cornell 5 lanes)	$1,000,000
106	Murray/US 26 WB	add 2nd WB RT Lane	$500,000
17b	Murray/Walker	increase cycle length by 20 seconds (to 120)	$125,000
19b	Murray/TV Highway	2 new signals, 2 RT Lanes, 2 Double LT Lanes	N/A
20b	Murray/Farmington	2 new signals, 2 RT Lanes, 2 Double LT Lanes	N/A
22b	Murray/Allen	add 2nd WB LT lane, 2nd WB RT lane, overlap WB RT lane (signal modification)	$1,250,000
107	Cedar Hills/Barnes	add 2nd NB lane and SB LT lane	$1,000,000
108	Cornell/Saltzman	add 2nd NB lane and SB LT lane (Cornell to 5 lanes)	$2,000,000
109	Canyon/Lombard	add EB RT lane	$500,000
65b	Denney/ORE 217 SB	add EB RT lane (structure work)	$1,100,000
110	BH Highway/Laurelwood	add SB LT lane (signal modification and ROW)	$2,000,000
111	Scholls Ferry/Laurelwood	install traffic signal, align with Nicol, ROW, 2 LT lane modifications	$1,750,000
112	Hall/ORE 217 SB/Cascade	add SB RT lane	$250,000
43b	Hall/Greenway	add EB RT lane	$500,000
42b	Hall/Denney	add 2nd WB LT lane	$500,000
36b	Farmington/Cedar Hills	add 2nd EB LT lane, ROW	$1,250,000
32b	Cedar Hills/Jenkins	Jenkins to 5 lanes, overlap WB RT	$125,000
31b	Cedar Hills/Walker	add 40 seconds cycle length to 140	$125,000
113	Murray/Brockman	add WB RT lane, SB RT lane, add 20 seconds cycle to 120 seconds, ROW	$100,000
47b	Scholls Ferry/125th	overlap SB RT	$125,000
50b	Scholls Ferry/ORE 217 NB on ramp	add 2nd NB LT lane and a 2nd WB LT lane	$1,000,000
		TOTAL	**$90,104,000**

Results

The result of these improvements is significant. While a D/C ratio of nearly 1.0 and LOS E still exist for the most part, the 2020 traffic conditions can be mitigated to the point that mobility can be preserved in Beaverton and congestion is manageable. Tables summarizing LOS are located in Appendix D and detailed calculations are in Appendices H through J.

Trucks

Efficient truck movement plays a vital role in the economical movement of raw materials and finished products. The establishment of through truck routes provides for this efficient movement while at the same time maintaining neighborhood livability, public safety, and minimizing maintenance costs of the roadway system. The through truck route map from the previous TSP was updated to include the expanded study area (See Figure 4-12) utilizing information from the currently adopted Washington County Transportation Plan (1988) and the recent RTP (2000). The objective of this route designation is to allow these routes to focus on design criteria that is "truck friendly"; i.e. 12-foot travel lanes, longer access spacing, 35-foot (or larger) curb returns, and pavement design that accommodates a larger share of trucks. The designated through truck routes in the TSP Study area include and exceed the coverage included in the RTP designations.

Safety

The existing collision data used for analysis in the Beaverton 2020 TSP was updated from the 2015 TSP with the most recent Washington County SPIS list. Table 4-19 lists the 10 highest ranked intersections from the Washington County SPIS in the study area (shown in Figure 3-7). Each of these top ten intersections is listed for capacity improvements. As the capacity improvements are made, safety enhancements can be incorporated into the design. In the short term, specific action plans should be prepared to address whether beneficial improvements at these locations can be made without affecting future plans.

The 2015 Beaverton TSP identified additional safety issues and strategies that are recommended as part of this 2020 TSP. The strategies are as follows:

- Road Widening: Improve safety on roadways by going from two lanes to three lanes and from four lanes to five lanes.
- Sight Distance Obstructions: All land use developments should be conditioned to maintain adequate sight distance where access to city streets is required.
- School Safety: Education and planning to ensure safety beyond pedestrian improvements ($10,000 per year)

Table 4-19
SPIS Ranking of Ten Highest Beaverton TSP Study Area Intersections

Ranking	Street	Cross Street	Number of Collisions (1997-1999)
1*	Baseline Road	185th Avenue	100
2	Murray Boulevard	TV Highway	133
4	Hall Boulevard	Scholls Ferry Road	85
5	Millikan Way/160th	TV Hwy	37
6	BH Highway	Scholls Ferry Road	47
8	Farmington Road	170th Avenue	31
9	Nimbus Avenue	Scholls Ferry Road	50
10	TV Hwy (Canyon Rd)	110th Avenue	29
12	Garden Home Road	Oleson Avenue	40
13	Farmington Road	Murray Boulevard	74

*Note that the intersection of Baseline/185th Avenue ranked higher than the intersection of Murray/TV Highway due in part to a larger number of fatal/major injury collisions (4 compared to 0).

Maintenance

The transportation maintenance system recommended in the 2015 TSP remains the recommended system in the 2020 TSP. The following strategies are the result of evaluation and ranking by the City of Beaverton Traffic Commission involved in the 2015 TSP:

- Maintain roadways using a balanced approach which develops a pavement management system and budget to address needs over a ten year period (65% of points)
- Maintain roadways using a need based approach which addresses current and future needs as they arise (35% of points)

Based on input from the City of Beaverton, the adopted maintanence budget for the fiscal year 2000-2001 was approximately $3.12 million (the 2015 TSP maintance budget was based on the 1997-1998 budget of $1.74 million)[17]. The 2000-2001 budget reflects areas annexed into the City and contingency costs that were not in the 1997-1998 budget.

[17] Based on data received from Steve Baker, City of Beaverton, June 15, 2001.

Parking

The City of Beaverton Development Code has been updated since the adoption of the 2015 TSP to include parking requirements (*City of Beaverton Development Code, 60.20*). This code includes both motor vehicle and bicycle maximum and required parking ratios for new development. In addition, the City of Beaverton has conducted a regional center parking study (*Beaverton Regional Center Parking and Street Design Study*), as recommended in the 2015 TSP. The implementation of these parking requirements is part of the City's action plan to meet the non-SOV modal targets.

Strategies for managing future parking needs in Beaverton were evaluated and ranked in the 2015 TSP. The strategies, ranked from most important to least important, are as follows:

- Shared Parking
- Parking Pricing
- Lower parking ratios for land uses within ¼ mile of LRT stations
- Parking needs should be reviewed by individual developments at the site plan review stage. Parking ratios should be compared to demand, as identified by ITE or DEQ[18]
- Maximum Parking Ratios

[18] *Parking Demand*, 2nd Edition, Institute of Transportation Engineers, 1987; and *Peak Parking Space Demand Study*, Oregon Department of Environmental Quality, by JHK & Associates, June 1995.

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City of Beaverton Transportation System Plan

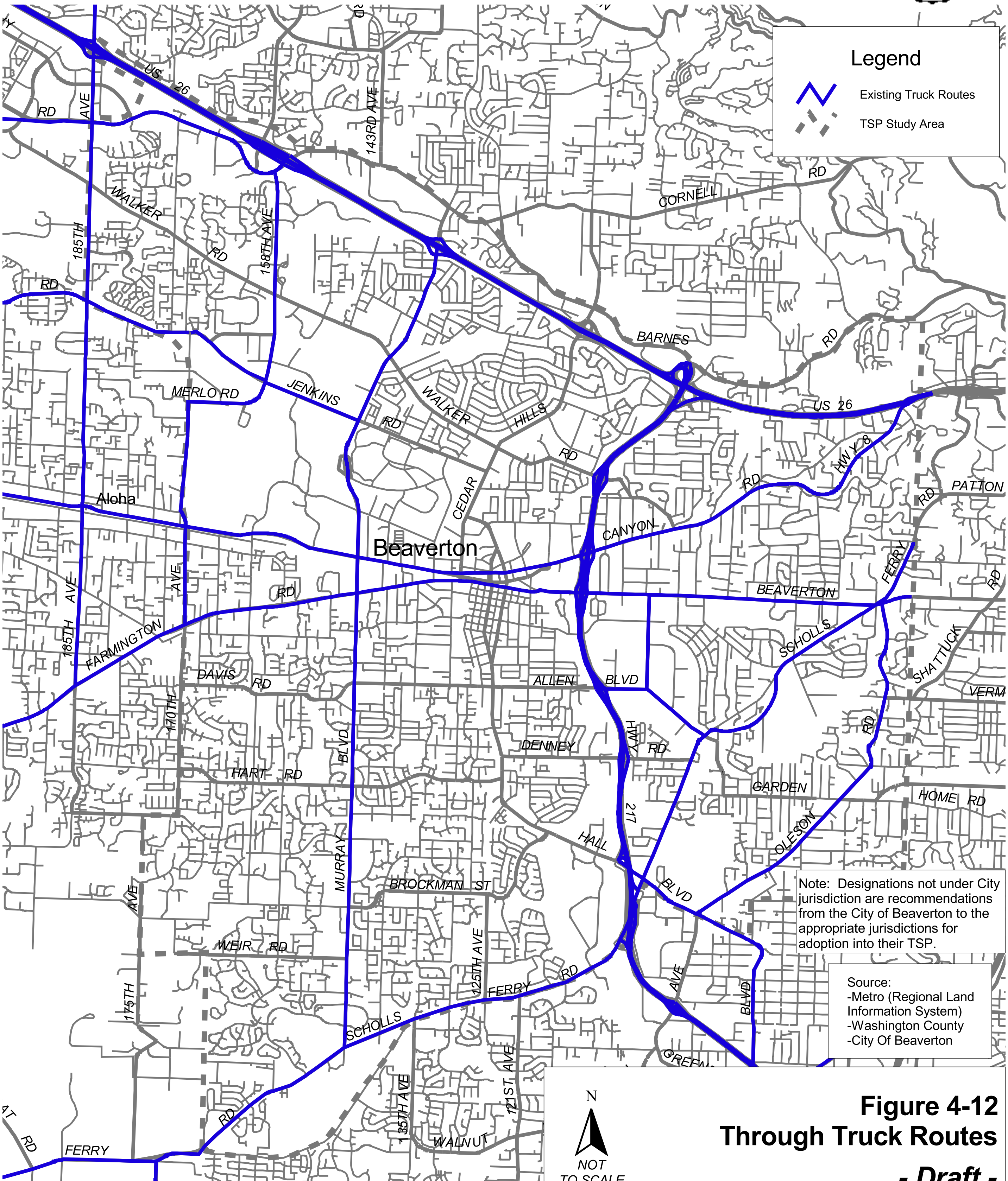

Figure 4-12
Through Truck Routes

- Draft -

Other Modes

The are four other modes of transportation included in the TSP: rail, pipeline, air, and water. All low-density rail lines within the TSP study area are operated by Portland & Western (P&W), a sister company of Willamette & Pacific (W&P) Railroad and a subsidiary of Genesee & Wyoming Incorporated. Trains operate in the Beaverton area seven days per week at various times throughout the day. The current train frequency and plans for growth in cars per train are not anticipated to change from the 2015 to the 2020 planning horizon. All other rail in the Beaverton TSP Study Area is for transit use (LRT and Commuter Rail, see Figure 4-13).
Figure 4-14 shows the existing pipeline plan for the Beaverton TSP Study Area. There are some natural gas pipelines in Beaverton, but no plans were identified for expansion. There is also a petroleum gas line (gasoline and diesel) that runs from the Port of Portland to Eugene through Beaverton, but no plans were identified for expansion[19]. Future expansion plans of the Kinder Morgan pipeline could change with market demand.

There are currently no airports within the Beaverton TSP Study area (see Figure 4-15). There are two private heliports (PGE and Turel) located in the southwest corner of Beaverton. There are also no navigable waterways in Beaverton.

[19] Based on conversation with Don Quinn, Manager of Pipeline Engineering, Kinder Morgan, February 1, 2001.

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City of Beaverton
Transportation System Plan

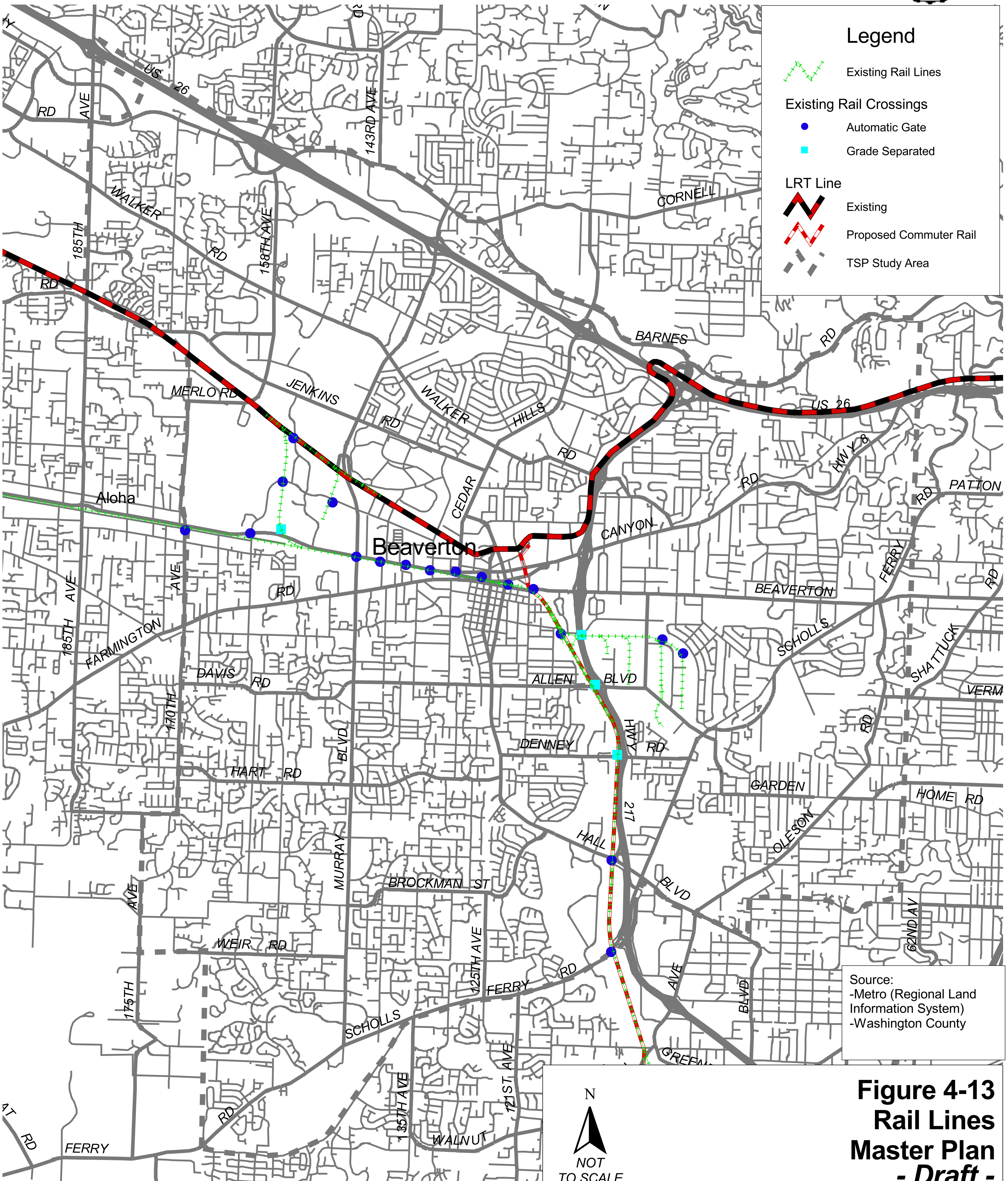

Figure 4-13
Rail Lines
Master Plan
- Draft -

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Transportation System Plan

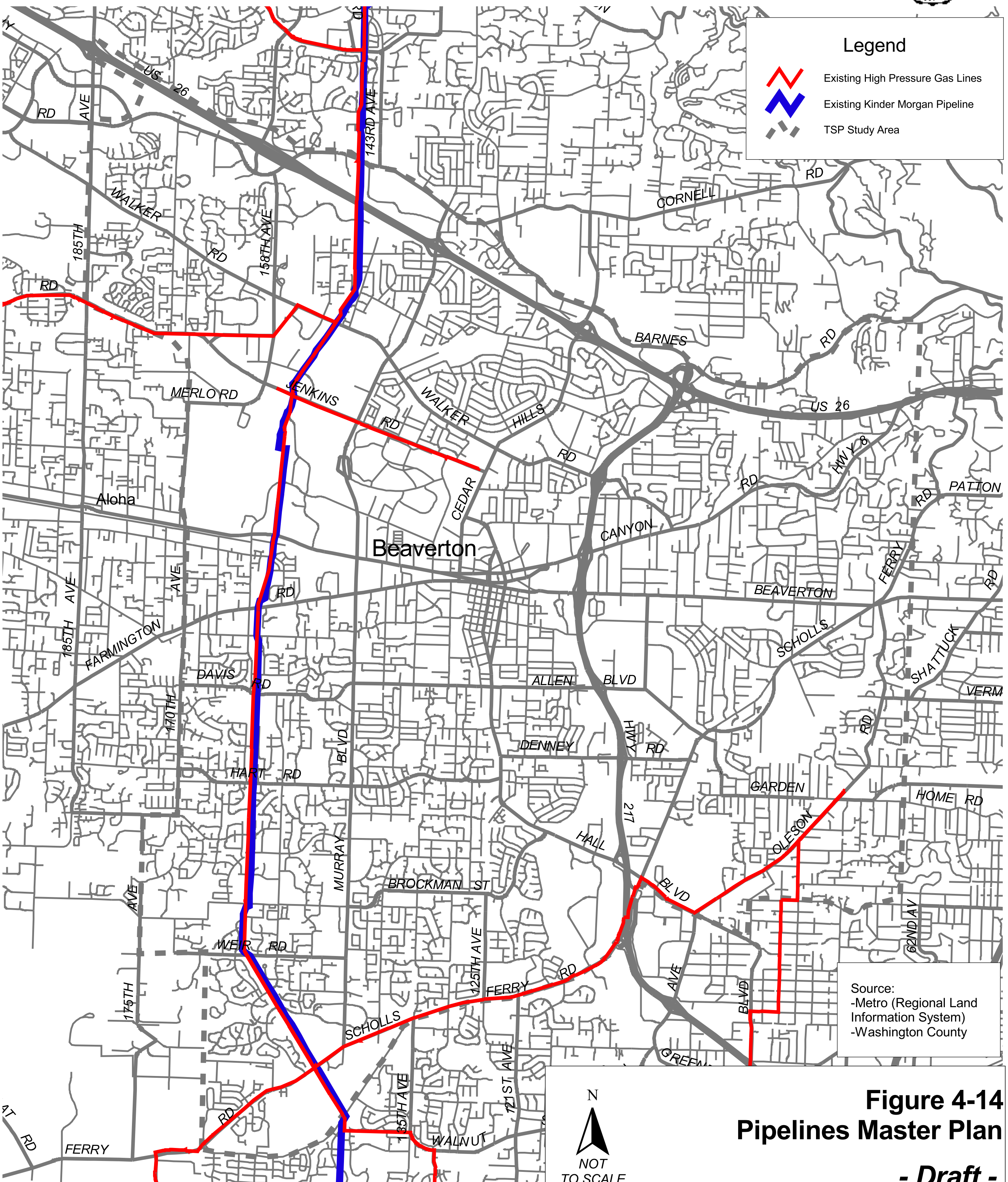

Figure 4-14
Pipelines Master Plan

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Transportation System Plan

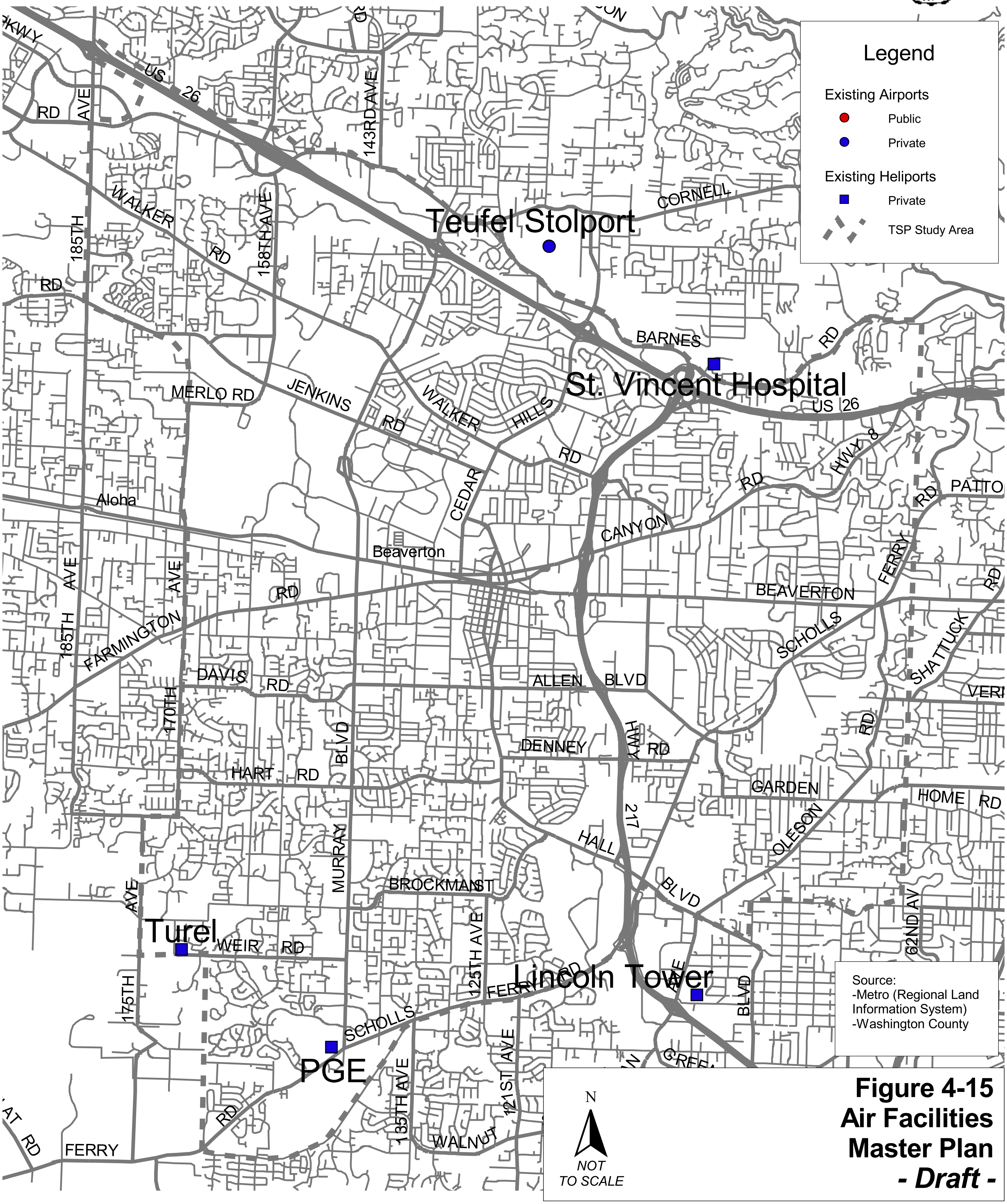

Figure 4-15
Air Facilities Master Plan
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